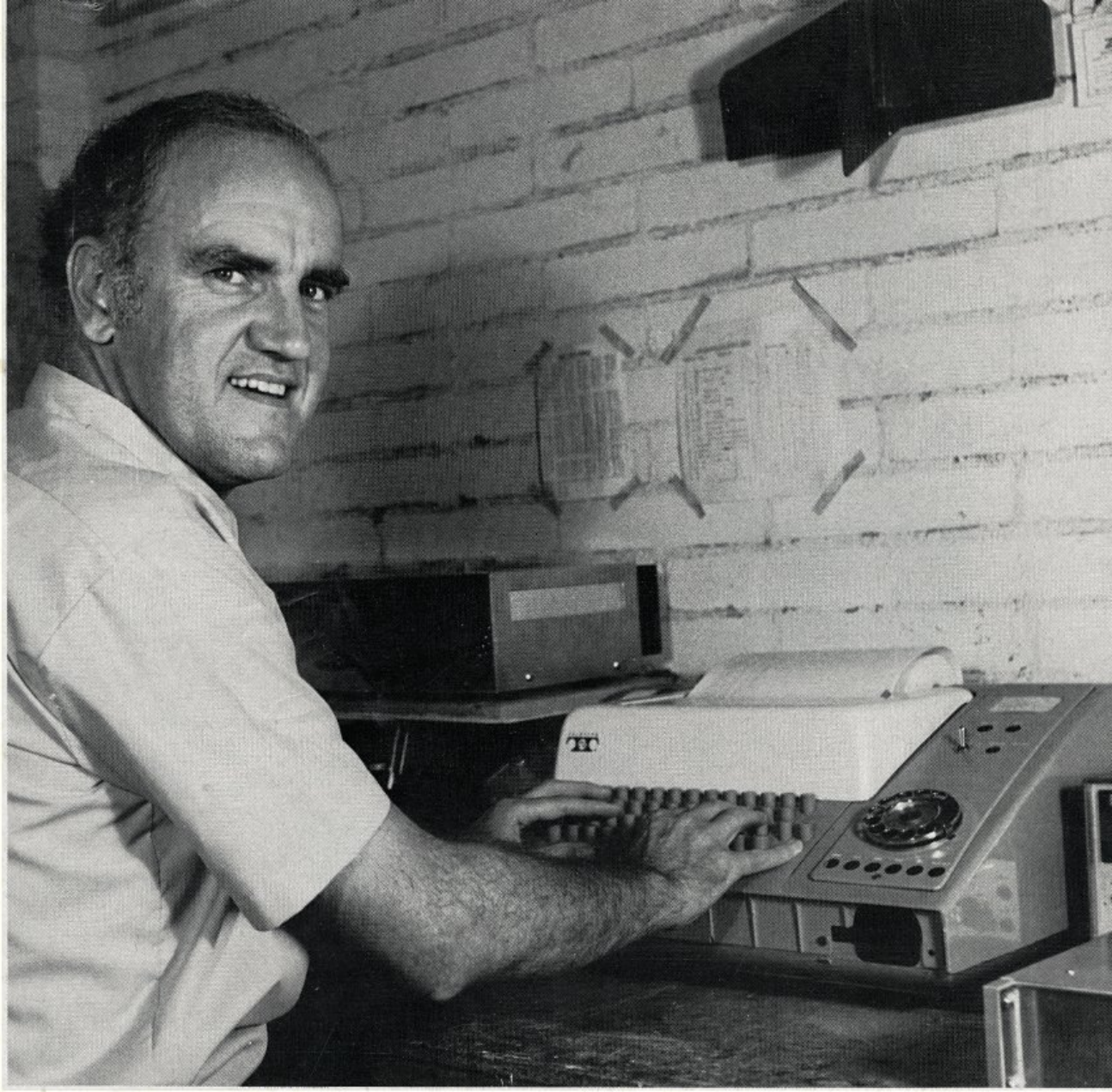
amateur radio



VOL. 45, No. 4 APRIL 1977

CONTENTS

COVER PHOTO

Dave Hull VK3ZDH is well known for his work as a control station for Oscars 6 and 7 and for AMSAT co-ordination in Australia. Dave is also a member of executive and in his spare moments keys up his extensive array of RTTY equipment.

Photo by Reg Goudge.

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DC/A: 50 uA, 5 mA, 50 mA, 500 mA.
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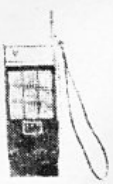

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QSP NOVICE TENURE DISCUSSED

At one of the regular meetings with the principal officers of the RFMD early in March, discussions were held on a range of current affairs of interest to the WIA representing the amateur service in Australia.

The Institute representatives were informed that the two year tenure on Novice licences is not a condition of the licence as was believed the case.

It was gratifying to be told that Novice Licensees will be authorised the use of a segment of the 10 metre band as early as this can be arranged. The Institute has asked for years that the segment 28.1 to 28.3 MHz should be allocated to Novice Licensees.

At the present time nobody can say if there will be any changes to the 11 metre amateur band in the foreseeable future. This must depend upon decisions on a "CB" service. The Department recognises that Novice licensees, in particular, possess an equipment investment in this band.

The reduction of licence fees for aged and invalid amateur licensees is still in the system awaiting the necessary legislation. ■

WIA CORRESPONDENCE

25th February, 1977.

The Minister for Posts and
Telecommunications,
Parliament House,
CANBERRA, ACT 2600.

Dear Sir,

1. I am instructed to refer to the Report to the Minister for Posts and Telecommunications on the introduction of a Citizen Band Radio Service to Australia.

2. In relation to paragraph 82 of the Report, attention is drawn to correspondence of 16.7.1974 with the Postmaster-General relating to this Institute's general views about a "CB" service, together with the following letters:—

My letter of 4.2.1976. Reply 315/1/63 of 18.3.1976.

My letter of 6.4.1976. Reply of 25.5.1976.

My letter of 15.9.1976 relating to the possible 68 per cent loss of frequencies if the amateur band (11 metres) is withdrawn from the Australian Amateur Service allocation. Interim reply of 21.9.1976.

3. This Institute, consistently and for as long as it has existed, has been concerned about illegal operations within the Amateur Service frequency allocations. These may be caused by intruders or pirates or by any other unlawful or unauthorised activity within Australia or emanating from any other country and affecting the lawful use of those frequencies here.

4. The illegal use being made of the Australian Amateur Service 11 metre band shared allocation (26960 to 27230 kHz) by unlicensed operators in recent times is of concern to this Institute.

5. The Institute believes that as these illegal operators are demonstrating a need for personalised communications for the public it is essential that this need should be seriously considered without unnecessary delay. The three options set out in the Report are considered to be useful for discussion purposes but should not eliminate the necessity for considering such other variations as would satisfy international obligations, acceptable administrative methods of regulation and control and the removal of illegal operators from spectrum usage.

6. If a "CB" service is to be introduced into Australia this Institute, in common with other interests representing users of the frequency spectrum, has no option but to insist upon the following paramount priorities —

(a) proper and effective control measures must be observed and enforced at all times;

(b) the detection, apprehension and conviction of illegal stations and operators must be vigorously pursued both now and at all future times; and

(c) adequate compensation is necessary if any existing Amateur Service allocation is withdrawn or reduced, or rendered virtually useless for ordinary amateur communication purposes.

7. This Institute commends for the most serious attention those parts of the Report relating to the numerous problems experienced in the USA and elsewhere on the operations of the CB services in those countries. It should be added that as Amateur Service licences were suspended in the public interest during the two World Wars any intended "CB Service" must also be capable of being closed down on immediate notice. Any deployment of manpower to achieve this objective at a critical time should receive consideration.

8. The Institute also wishes to set out what may be termed secondary considerations relating to the introduction of any new or expanded service. These are —

(a) real and potential interference to other services, equipment and facilities;

(b) the unlawful use of equipment for overseas communications;

(c) the ease of converting existing equipment for use on other adjacent, close or related frequency allocations;

WIANEWS

WARC 79

Two meetings of the Executive were held during February. At the first one, the WIA submission, on WARC 79, to the chairman of the APG's Committee No. 2, was finalised.

As might be expected this runs into a great many pages and would be much, too lengthy to publish in AR. Copies will be supplied to Divisions, as soon as they have been completed including the appendices.

It is understood that the Australian amateur radio case will be prepared by Committee 2 drawing freely on the WIA submission.

As a matter of interest the submission took many months to prepare and several drafts were made before final acceptance. It has drawn freely on material supplied by the IARU, both of a general nature and specifically referring to individual countries such as the USA, UK and Canada.

CB

The second meeting of the Executive discussed the WIA submission to the Minister about "CB". This is published elsewhere in this issue.

1977 CALL BOOK

WIANEWS in February AR reported developments about the 1977 Call Book. Representations were made to the Australian Government Publishing Service early in February concerning the material supplied for the call book and various other aspects of the proposed contract.

As a result further discussions will be held with the RFMD. The delays are such that the publication of any call book is unlikely to occur before mid-year. The Institute has everything ready for the call sign data to be processed. Negotiations began as long ago as January 1976.

Readers will be aware of the intention to produce the call book using our EDP membership details in conjunction with the P & T Department's records for non-members. Members recorded as unfinancial at the chosen date will be listed from non-members data. The "chosen date" can only be determined when the contract negotiations have been finalised.

1977 FEDERAL CONVENTION

A number of purely organisational agenda items have been submitted as Agenda Items by the Executive. Additionally other items are being submitted on various outstanding policy questions.

One recommends the adoption of ± 7 kHz as the maximum deviation for FM transmissions in the VHF/UHF amateur bands.

Two more propose the adoption of band plans for the 52-54 MHz and 144-148 MHz bands. These were originally published in AR for August 1975 and are almost wholly unchanged.

Yet another will require the WIA to seek approval from RFMD for F5 transmissions in amateur bands from 1215 MHz upwards.

WICEN

The proposal to hold a State WICEN Co-ordinators' meeting (see WIANEWS Jan. '77) has not materialised. It is likely that the Federal Convention will discuss this important activity however.

REPEATERS

Latest information is that the VK3 Division will be hosting a repeater meeting early in April with visiting VK1 and VK2 repeater representatives to discuss mutual problems relating to RTTY repeaters and additional channels. This does not exclude attendance by other Divisions but the problems for discussion seem to affect only the three participants. It is to be expected that recommendations will thereafter be prepared for Federal Convention discussions. The expense involved in attending such meetings is considerable and this may influence decisions in the more distant Divisions.

GENERAL

Early in April the Federal President, Dr. Wardlaw, will attend the opening of the VK5 Divisional Headquarters in Thebarton and hopes to hold discussions with as many groups and individual members in Adelaide as possible during his visit.

The Federal Convention will be held in the Brighton Savoy Motel from 09.00 hours on Saturday, 23rd April, concluding on Monday, Anzac Day. By the end of February no Agenda Items had been received from Divisions. The Executive would greatly appreciate offers of assistance by members for the Convention. In particular assistance with the recordings would be most welcome. Even apart from this, come along to the Convention and see what goes on for the benefit of amateur radio in Australia. ■

WIA CORRESPONDENCE (continued)

(d) the exercise of intelligently administered controls over the importation and/or acquisition of equipment for any new or expanded service; and

(e) the establishment of any new or expanded service should be so designed as to create the minimum diversion of staff.

These considerations relate in general to technical criteria. Both (a) and (b) as well as (d) have received mention in the Report. In relation to (e) the relevance of paragraph 51 of the Report must be noted particularly as Amateur Service affairs have been accorded such a low priority for some years because of the staff situation within the Department. All offers of help by the Institute in specific areas have also been consistently rejected although consistently re-affirmed.

9. It is the considered view of this Institute that a service for a "CB" type of operation could be evolved which meets all the priorities listed in paragraph 6 above and most of the considerations outlined in paragraph 8.

10. If a decision is reached in favour of establishing any new or expanded service it is recommended that a technical committee should be appointed to determine the essential parameters, specifications, limitations and controls. It would be the wish of the Institute that it should be officially represented on such a committee.

Yours faithfully,
P. B. DODD,
Secretary. ■

QSP

NEW 3.4 GHz RECORD

The Chairman VHFAC advises a new Australian record of 70.9 miles for the 3400 MHz band between VK2AHC/P at Terrey Hills and VK2SB/P on Mount Gibraltar, near Mittagong on 16.1.1977.

ANOTHER GOLDEN JUBILEE

The ARI announces it will be celebrating its 50th anniversary in Florence during September this year. There will be an international Home Constructions Contest as well as a radio historical exhibition. Station IK50ARI will be operational.

SPECIAL CALL SIGN

In March approval was obtained from the RFMD for the use of the suffix HRH only with official WIA stations whilst the Royal Party is in the State concerned. Thus the call sign AX4HRH will have been aired and possibly one or two others in other States.

IARU NEWS

An interesting little item was recently noticed. It suggested that using CW in the USA on a repeater might be somewhat ludicrous.

During December a visitor to Melbourne was DJ8XW on his world tour outlined in December AR, page 48. Peter writes for DARC in their amateur magazine and was a source of many little news items.

Another interesting visitor was G2YS, John Swinnerton, in the shack of VK3XB.

Worldradio for January 1977 contains an article by K4NSS listing the USA FCC proposals for the amateur service for WARC 79 contained in lengthy docket 20271. Because of the excellent work of the IARU the proposals are similar to — but differ in a little detail because of referring to Region 2 — those now being submitted to the Australian authorities — see WIANEWS in this issue.

A telegram of condolence was despatched by the Federal President to HRH King Hussein JY1 to which he replied "I am deeply grateful to you and the members of your organization for the heartfelt expression of sympathy at the loss of our Queen Alia. May God keep you all." ■

RTTY LINE GENERATOR

Ron Catmur VK5FY
142 Woodford Road, Elisabeth North, S.A., 5113

There have been a number of circuits in Amateur journals for RTTY Message Generators of the electronic variety, but they all seemed to suffer from a number of shortcomings, in that:

(a) They were too short — just a Call Sign.

(b) They required the message to be typed in, and it was lost if the power was removed.

(c) They used "exotic" devices, and the message was permanent.

To overcome these shortcomings, the unit to be described was constructed with the following basic specification:

(a) A capability of at least 65 characters — almost a full line.

(b) Uses standard TTL devices with a single 5 volt supply rail.

(c) Messages are pre-programmed on plug-in circuit boards, making changes from one to another easy.

(d) The message content of any board can be changed later if desired.

GENERAL DESCRIPTION

Figure 1 shows a block diagram of the system. The input is 800 pulses per second (derived from a crystal controlled speed converter unit) which is divided by 16 to produce 50 pps. (50 Baud rate, which is down converted by the external speed converter unit.) The 50 pps now drives an 8 Bit Counter, the output of which is fed to the 8 Bit Multiplexer. Now the Multiplexer accepts parellel data and converts it to series at the 50 pps rate. If you are not familiar with multiplexers, they can be likened to a cobbler putting a handful of nails in his mouth — parallel input — and pushing them through his lips one at a times — series output. The 8 Bit Counter acts like the cobbler's tongue, it determines the rate at which the information bits are fed out. To go one stage further, if the nails were of two different lengths, then the cobbler's tongue would sort them out as he required them by length. That brief explanation should have the Multiplexer action licked, as it were.

The Multiplexer has bits 1, 7 and 8 permanently wired as the Start and Stop pulses required by the Baudot Code. Bits 2 to 6 inclusive are the information bits, which determine the required character, or function. These 5 bits are produced from a diode matrix, which has 30 inputs — A to Z, plus Space, Figs., Carriage Return, and Line Feed. An earth, or low level on any one input will produce the required Marks and Spaces for that character on the 5 information lines.

Thus, we have so far managed to produce the correct Code for each character, and all that remains is to determine *when* the character is to be transmitted.

This is done by the Slot Counters and Decoders. Every 8th pulse from the 8 Bit Counter is fed to a Slot Counter, which is really a divide by 10. The Binary Coded Decimal (BCD) output of this Counter is fed to a Slot Decoder, which has 10 separate outputs, each of which goes low sequentially. The Slot Decoder is in fact a BCD to Decimal Converter. So, one Slot Counter, and its associated Decoder, produces 10 slots sequentially, each slot being 8 bits wide. These slots are connected to the diode matrix inputs as required. The example at the bottom of the Block Schematic shows how the slots are connected to produce CQ de VK5FY.

In order to generate 65 slots, 7 Slot Counters and Decoders are required, plus a 10's Slot Counter and Decoder, which, in a similar manner to the operation of the Slot Counters, allows the Slot Counters to operate in sequence — 0-9, 10-19, 20-29 and so on.

A selected Line Stop signal can be switched to stop the generator after one line, or to allow the line to be repeated as often as desired.

Figure 2(A) shows the output waveforms of the Bit and Slot Generators. The input to the Slot Counter is the same as the "C" output of the 8 Bit Counter (Waveform 1). The negative going edge occurs at every count of 8 (or 0). The output waveforms (2) A, B, C and D of the Slot Counter are fed to the Slot Decoder which has 10 independent outputs (3) designated 0 to 9. Each of these outputs is normally high, and goes low for one input count progressively. Starting at 0, the Decoder output 0 is low until the 8th pulse from the 8 Bit Counter occurs, then the 0 output of the Decoder goes high, and the 1 output goes low. After the second count of 8 bits, 1 goes high, and 2 goes low, and so on as the count progresses. It will be seen that in the Reset condition, Slot 0 is held low, so it is not used in the Code Generation. However no input to the diode matrix results in the "LTRS" function being produced which is always desirable at the commencement of a line.

The example at the bottom of Figure 2(A) shows Slot 0 as LTRS; Slot 1 as C; Slot 2 as Q; and so on until Slot 9 gives FIGS prior to the required figure 5 in the Call Sign.

Figure 2(B) shows the waveforms of the 10's Slot sequence. Each time the last slot of a Slot Decoder is generated, output 9, (4) a positive pulse appears at the output of the 10's Detector (5). This pulse falls low at the end of the output 9, and it is

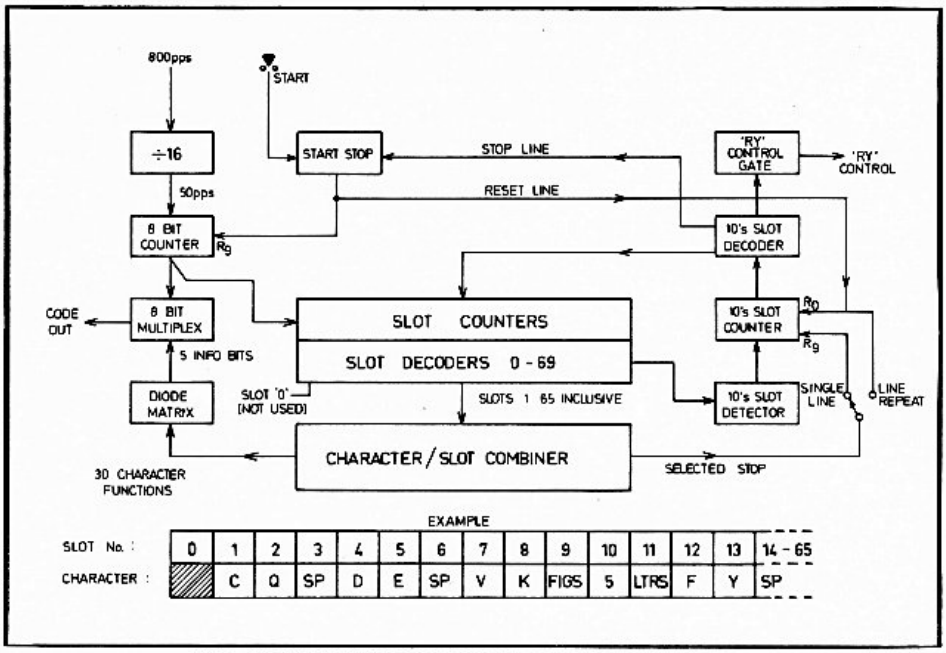

FIG. 1. RTTY LINE GENERATOR BLOCK SCHEMATIC.

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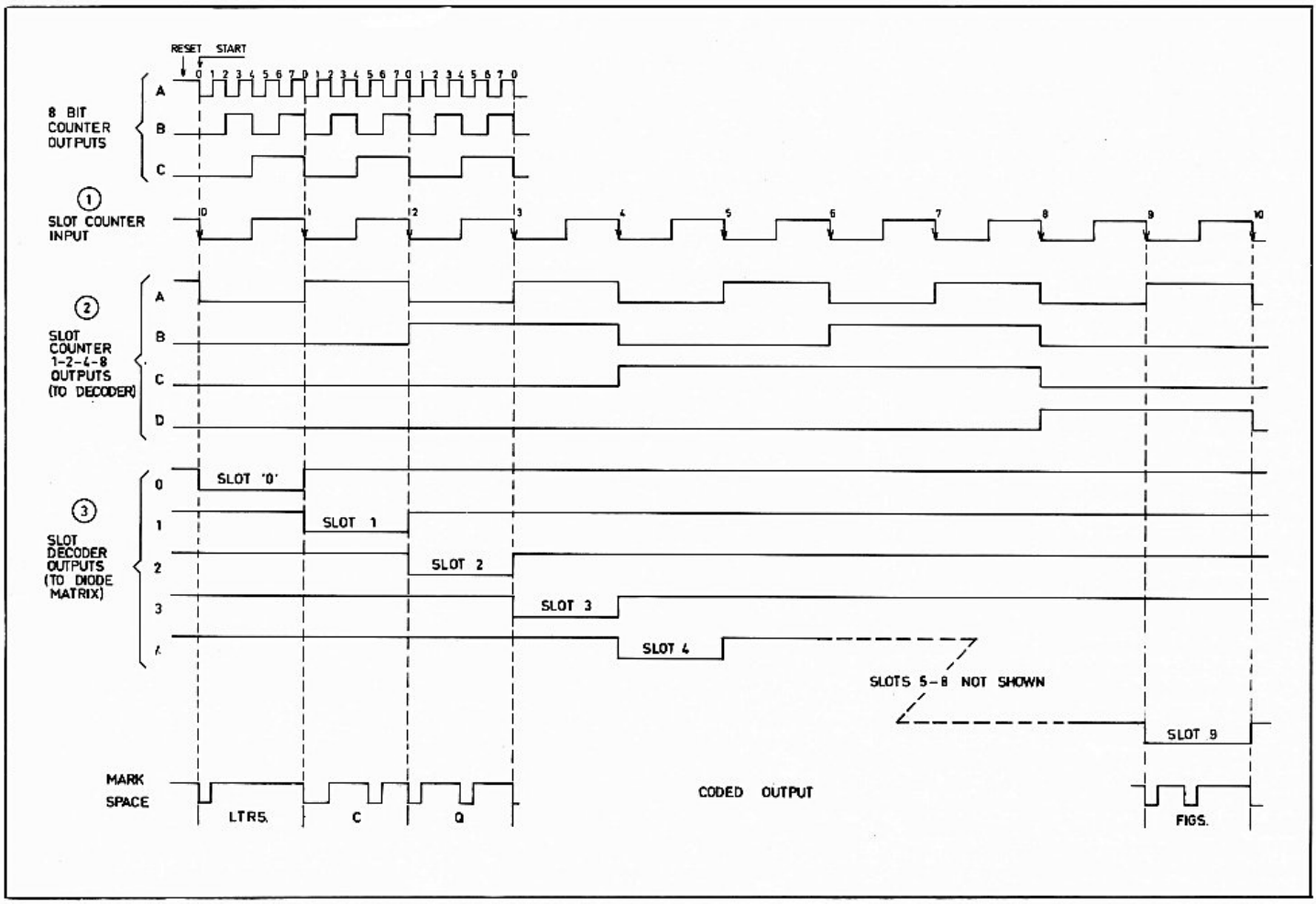


FIG. 2A. BIT AND SLOT WAVEFORMS.

this negative transition that drives the 10's Slot Counter. The 10's Slot Decoder,, being driven by the Counter produces a series of low outputs each of which is 10 slots long. At the commencement of the count, output 0 is low (6), and remains so until the end of the ninth slot, when the 0 output goes high, resetting the 0-9 Slot counter. At the same time, output 1 goes low, removing the reset from the 10-19 Slot Counter, so the count proceeds. At the end of slot 19, Slot Counter 10-19 is inhibited, and 20-29 is activated, and so on.

It will be seen that with the 7 Slot Counters/Decoders used a total of 70 slots are available, however, because a 50 + 50 pin connector was used, a total of 100 pins were available, and these have been allocated as follows:

2 for power rails (0 and 5 volts), 3 for RY control, and one for a Line Stop function. This leaves a total of 95 for the message generation. Now, out of these, 30 are required for inputs to the diode matrix, leaving 65 available for slot allocation. Since the accepted number of characters per RTTY line is 69, we haven't lost many. Of course, non-print functions are included in the 65, but that goes for any TTY message.

An RY generator board uses a Flip-Flop (driven by output "C" of the 8 Bit

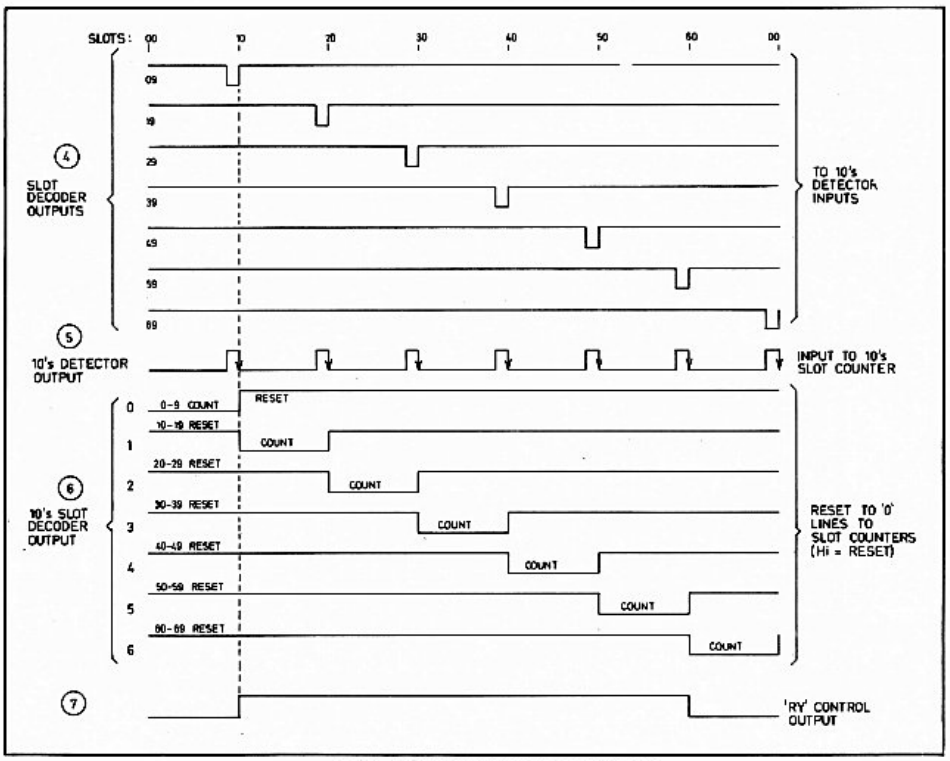


FIG. 2B. 10 SLOT SEQUENCER.

Counter) to produce alternate R and Y slots. A Control signal (7) derived from the 10's Slot Decoder, allows the Flip-Flop to operate only from Slot 10 to Slot 59 inclusive. The "RY" board allows Slots 1-9 for a Call Sign, 10-59 for RY, 60-65 for Carriage Returns, Line Feed and Line Stop functions.

CIRCUIT DESCRIPTION

Figure 3 shows the circuit diagram of the Code Generator and Control section. Consider the unit to be in the Reset condition. 800 pps are being applied to the input of U1, which divides them by 16, the resultant 50 pps being fed to:—

(a) The 8 Bit Counter, U2.

(b) Via an inverter, U5c, to the Count Pulse input of Flip-Flop 1 (part of U4, a Dual D Flip-Flop).

Now, because the unit is reset, output Q2 of U4 will be high, and as a result, U2 is held in the "Reset 9" condition. Q2 is low, and this is fed to the Slot Generator section as a reset level, and to SD1 of U4. The Truth Table for either section of U4, shows that a low on SD will force the Q output high, thus, since SD1 is low, Q1 will be high, activating the Strobe input S, of the multiplexer, U3. If S is high, then the output W will be high, irrespective of what information is present at the Data inputs 0-7. The Code output is therefore high, the Mark condition.

When the START switch is operated, input RD2 is taken low, which forces Q2 low (and Q2 high). When Q2 goes low, the "Reset 9" condition of U2 is removed, and U2 will commence counting upon the arrival of the first falling edge of the 50 pps input signal. At this stage, there could be up to 20 milliseconds delay, depending on just when the Start switch was operated . . . however the Mark signal at the output must be maintained until U2 commences counting. This is achieved in the Flip-Flop 1 section of U4. The removal of the low level on SD1 now leaves FF1 ready to accept an input pulse at CP1. The Data input D1 is held low, which will cause Q1 to go low when the first *positive* pulse is received at CP1, and this will remove the Strobe signal from U3. Because the 50 pps has been inverted to the CP1 input, it follows that the falling edge, which activates U2, will become a rising (or positive going) edge at CP1. Thus, as U2 commences counting, the Strobe condition of U3 is removed, and the output bits will appear. Output W gives an inverted version of the Data bits, so, Bit 0 will be low, the Baudot Start bit. Bits 1-5 will follow in sequence, then Data inputs 6 and 7 being held low, will appear as Marks, the Stop bits. It should be noted that the SN74151 also has a Non-Inverting output, but the Truth Table shows that the Strobe input when activated, gives a low output at this point which would be a Space condition on reset.

U2 is connected as a divide by 8, instead of a divide by 10, this is achieved

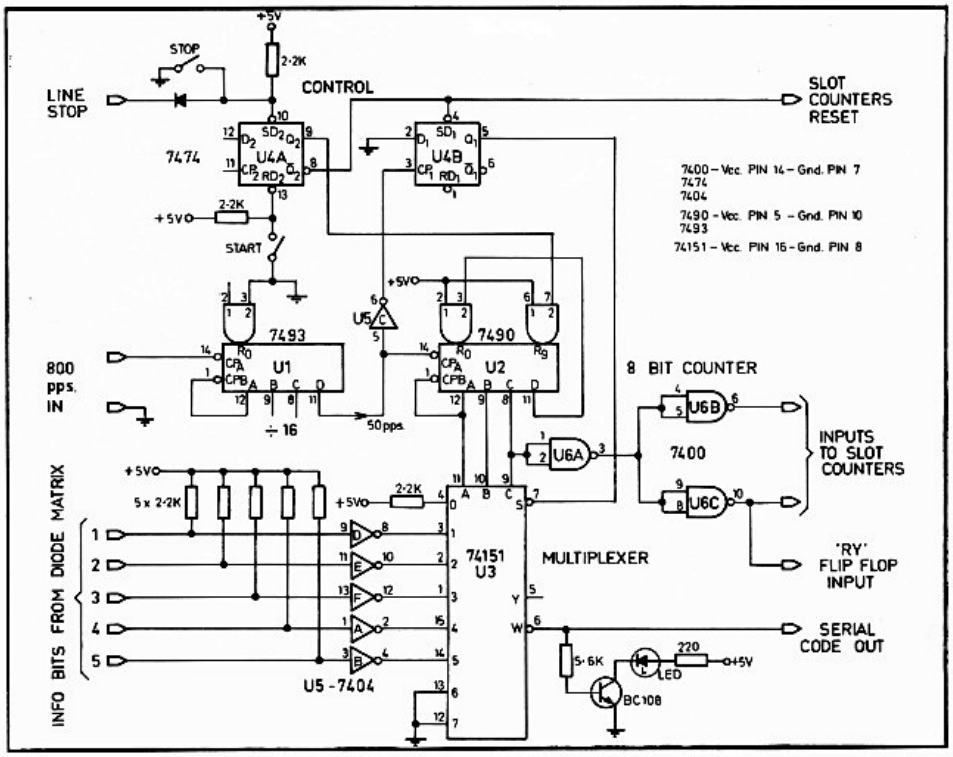


FIG. 3. CODE GENERATOR AND CONTROL.

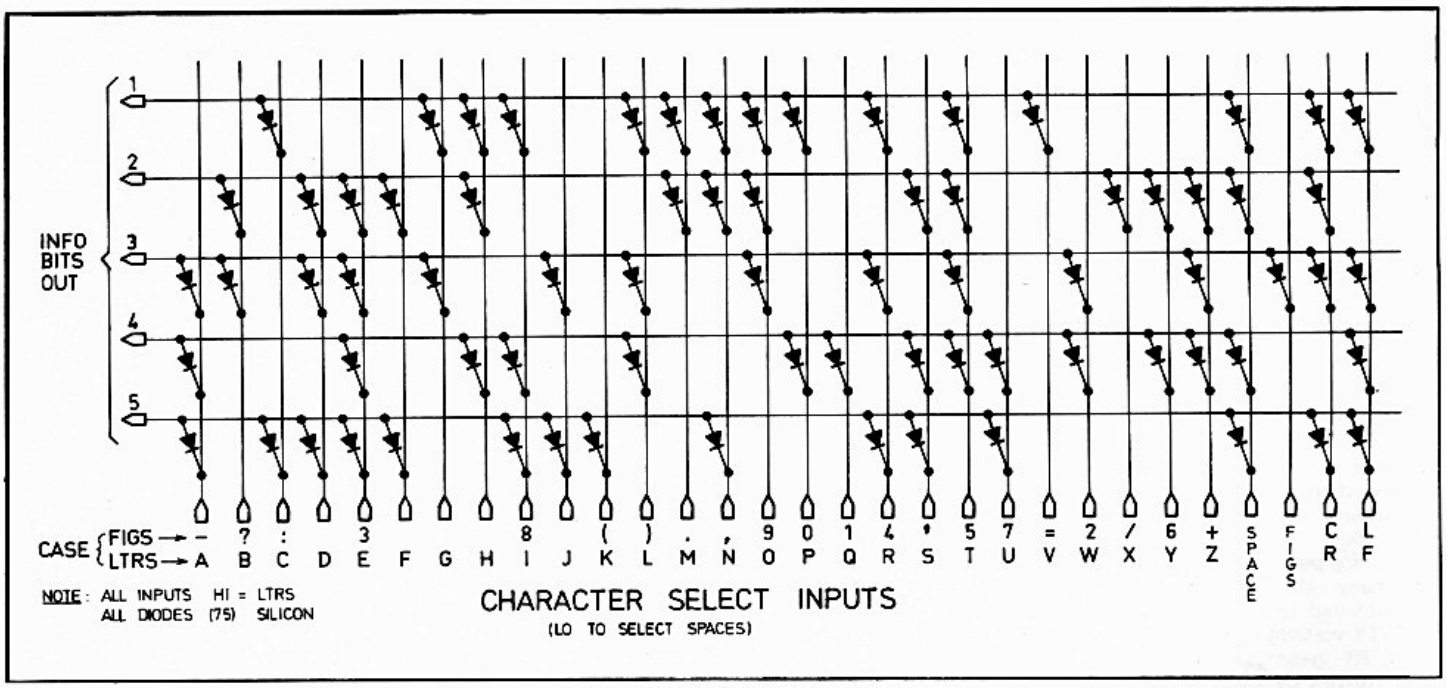


FIG. 4. BAUDOT CODE MATRIX.

by connecting the D output of U2 to its "Reset 0" input. As soon as D goes high (which it does on the count of 8), the counter resets itself to 0. Output C, as well as going to the multiplexer U3, also passes via an inverter U6a, to two inverter buffers, U6b and c, which provide Count Pulses to the Slot Generators. Two outputs are necessary to keep the loading within the prescribed fan-out limits for TTL devices.

The info (or Data) bits 1-5 are fed to U3 via individual inverters, the inputs to which are held high by virtue of the 2,200 ohm resistors. Whenever a Space bit is required, these input(s) will be taken low, which in turn will present a high to the Data input(s) of U3.

Figure 4 shows the Baudot Code Matrix. It uses 75 silicon diodes wired in such a manner that a low on any one of the 30 Character Select inputs, will cause the info lines to go low *wherever a Space bit is* required. For example, if a low level is applied to the Character Select "C", the info lines will present Low, High, High, high, Low, respectively 1-5. This will appear at the Code output as Space, Mark, Mark, Mark, Space. When no low is present on any of the Character Select lines, all Mark will be generated, which corresponds to the "LTRS" function.

When a STOP is required, SD2 of U4 is taken low, causing Q2 to go high, resetting U2 to "9". Q2 goes low, forcing Q1 high which activates the Strobe of U3 and the Code output goes to steady Mark. At the same time the Slot Generators are reset.

Figure 5 is the circuit diagram of the Slot Generators. Count pulses from U6b are applied to the inputs of Slot Counters 0, 1, 2 and 3 (U7, 8, 9 and 10) whilst those from U6c go to Slot Counters 4, 5 and 6 (U11, 12 and 13). For convenience, Slot Counters/Decoders 2, 3, 4 and 5 have been omitted from the diagram, but their wiring details are the same as 1 or 6 (U8 or 13).

The "Reset 0" input of each Counter is controlled by the appropriate output of the 7442s Slot Decoder, U23. That is Slot Counter 0 from output 0 of U23, Slot Counter 1 from output 1, and so on.

The outputs of the Slot Counters feed their associated Slot Decoders, the decimal outputs of which are designated by Slot Number. It will be seen that with the exception of the first Slot Decoder, U14 (Slots 0-9), the remainder have their "0" outputs fed via a 2 input NOR Gate, and then inverted. The other input of the NOR Gate is wired to the "Reset 0" line of the associated Slot Counter. This prevents a low output from appearing on Slots 10, 20, 30, 40, 50 and 60 when the Slot Counters and Decoder are in the Reset 0 condition. The NOR Gate will give a high out to the inverter *only when both inputs are low*, thus a low output can only appear at the Slot numbers previously mentioned when the Reset 0 has been removed, and the Slot Counter is in the 0 count segment.

Slots 9, 19, 29, 39, 49 and 59 are also wired to the inputs of an 8 input Gate, U21, the 10's Slot Detector. The output of U21 goes positive every time one of these slots occur. The falling edge of the output pulse drives the 10's Slot Counter, U22, arranged as a divide by 7. The 10's Slot Counter U22, drives the 10's Slot Decoder U23, the decoded outputs of which sequentially control the Slot Counters. Outputs 1-5 are also fed to the inputs of an 8 input Gate U24, the "RY" Control Gate. The output of U24 is high from Slot 10 to Slot 59 inclusive. Details of the "RY" Generator board are given later on.

A LINE STOP signal derived from a selected slot, can be applied to either:

"Line Slot *STOP* Input", U27c, on to "Line Slot *REPEAT* Input", U25d, via a diode. In the first condition (input to U27c), U22 becomes reset to 9, and therefore U23 output 9 goes low. This low is applied to the Stop input of the Control section (U4). The Code Generator section is reset as previously described, and a low output from Q2 of U4 is fed to the input of Gate U25d, via an isolating diode. This causes U22 to go from Reset 9 to Reset 0, similarly the Decoder U23 presents a low on its 0 output, which resets the Slot Counters. Thus, one Line only is sent.

In the second case, the selected LINE STOP signal is applied to U25d, again via an isolating diode, which resets U22 and U23 to 0, which in turn resets the Slot Counters to 0. However in this case the Generator section is still operating (since it requires an output from U23 "9" to reset it), so the line is repeated without a break in the transmission. The line will continue repeating until such time as the LINE STOP signal is switched through to U27c, then the transmission will cease at the selected time.

MESSAGE FORMAT BOARDS

The information required to be transmitted as a line, requires the connection of the appropriate Slots to the Character/Function input of the matrix. To make the system flexible, in terms of changing the message formats, plug-in boards are used. A 50 + 50 pin socket has wired to it the 30 matrix character inputs, plus Slots 1-65, and 5 other sundry services. Figure 8 shows the wiring arrangements of the socket used. The plug-in board is used to make the necessary connections between the Slots and the Character inputs. One small problem presents itself here, when

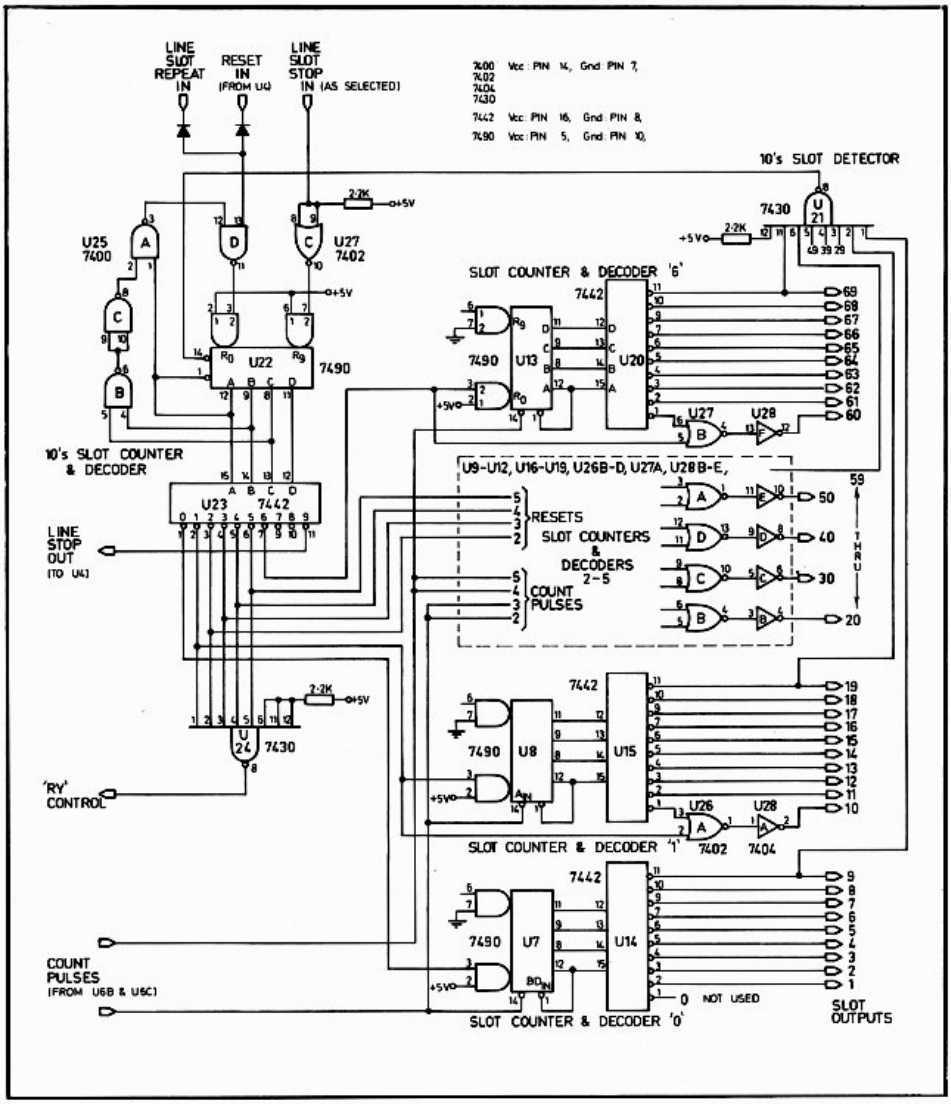
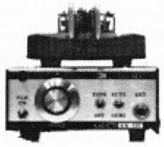


FIG. 5. SLOT GENERATOR.

For KATSUMI Electronic Keyers



EK-127 Keyer & KM-22 Paddle

FEATURES
- Squeeze type double paddle with dot and dash memories.
- Built in sidetone and tone control.
- Switchable Semi ("Bug") or fully Auto operation.
- KM-22 has heavy base plate.
- Transceiver keying achieved with a heavy duty transistor switch (150V 2 Amp DC)
- 230V AC operation.

EK-150S Single Paddle

EK-150D Double Paddle

Also available MK-1024 programmable electronic keyer has 1024 bit memory. Also a large range of hand keys available. **Prices and specifications are subject to change. Freight and insurance extra, allow 50 cents per $100 dollars insurance.**

Prices EK-127 $97
EK-150S $106
EK-150D $106

FEATURES
- EK-150 is available in two versions, one type with squeeze type double paddle (EK-150D) and the other with standard single paddle (EK-150S).
- Plug in Circuit Board.
- Full dot and dash memories.
- Built in sidetone with tone and volume controls.
- Switchable Semi (Bug) or full Auto operation.
- Built in speaker and headphone jack.
- Heavy duty transistor switch for 150V, 2 Amp DC and built in high speed relay (Ratings 700V, 500mA).
- 230V AC or 7-13.5V DC operation.

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Application	SSB-Transmit.	SSB Receive	AM	AM	FM	CW RTTY	CW RTTY
Number of Filter Crystals	5	8	8	8	8	4	8
Bandwidth (6dB down)	2.5 kHz	2.4 kHz	3.75 kHz	5.0 kHz	12.0 kHz	0.5 kHz	0.5 kHz
Passband Ripple	< 1 dB	< 2 dB	< 2 dB	< 2 dB	< 2 dB	< 1 dB	< 0.5 dB
Insertion Loss	< 3 dB	< 3.5 dB	< 3.5 dB	< 3.5 dB	< 3.0 dB	< 5 dB	< 6.5 dB
Input-Output Z_t	500 Ω	500 Ω	500 Ω	500 Ω	1200 Ω	500 Ω	500 Ω
Termination C_t	30 pF	30 pF	30 pF	30 pF	30 pF	30 pF	30 pF
Shape Factor	(6:50 dB) 1.7	(6:60 dB) 1.8 (6:80 dB) 2.2	(6:60 dB) 1.8 (6:80 dB) 2.2	(6:60 dB) 1.8 (6:80 dB) 2.2	(6:60 dB) 1.8 (6:80 dB) 2.3	(6:40 dB) 2.5 (6:60 dB) 4.4	(6:60 dB) 2.2 (6:80 dB) 4.0
Ultimate Attenuation	> 45 dB	> 100 dB	> 100 dB	> 100 dB	> 90 dB	> 90 dB	> 90 dB
Price	$33.55	$47.75	$51.40	$51.40	$51.40	$35.95	$67.15

In order to simplify matching, the input and output of the filters comprise tuned differential transformers with the "common" connections internally connected to the metal case.

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Matching Oscillator Crystals

XF900 Carrier	9000.00 kHz	$4
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F05 Crystal Socket (HC 25/u)		.50

Oscillator Crystals 50 kHz through 150 MHz available to order. Parallel resonant (30 pF) to 20 MHz, series resonant above 20 MHz. Write for quotation to your requirements (include mechanical size & frequency).

Matching FM Crystal Discriminators for XF-9E

	Freq. Dev.	Slope	Price
XD-9-01	+ 5 kHz	—40 mV/kHz	$25.30
X9-9-02	+10 kHz	—24 mV/kHz	$25.30
XD-9-03	+12 kHz	—50 mV/kHz	$25.30

SPECTRUM INTERNATIONAL INC. Box 1084A, Concord, Mass. 01742 USA

characters have to be duplicated in a line, such as "Space" as an example. The Slot outputs cannot be paralleled directly because when one slot is low, the others are high, and a HIGH is parallel with a LOW = Short Circuit = disintegrated Circuit! It is not possible to use diode isolators directly in series with the matrix inputs because the info lines would not go low enough. It becomes necessary to isolate the matrix from the parallel slots by means of either NAND Gates plus Inverter, or Diode isolators and Non-Inverting Buffers. Both types are shown in Figure 7(A) and 7(B).

"RY" GENERATOR BOARD

Most operators like to have an "RY" generator to test their machines, and such a circuit is shown in Figure 6, together with the important waveforms. This board provides slots 1-9 for a Call Sign, 10-59 for RY's, 60-65 for Carriage Returns, Line Feed, and Line Stop functions. A total of 25 RY's are sent. The Flip-Flop U1, when operating, has its Q and Q outputs fed via control Gates to the R and Y matrix inputs. During slots 0-9 inclusive the RY Control waveform is low, which:

(a) Holds U1 inhibited with Q high, and Q low.

(b) Holds gates U2a and b inhibited, both their outputs being high.

When the 10th slot occurs, the "RY" Control line goes high, and the Gates U2a and b give an inverted output of the levels present at Q and Q of U1. In this case, U2a is low, and U2b high. Since U2a is connected to the "R" input of the matrix via a non-inverting buffer, an "R" is transmitted. When the next pulse from the 8 Bit Counter is received by U1, the Q and Q outputs, and hence the outputs of U2a and b, change state. The "Y" now appears in slot 11. So the sequence progresses until the 60th slot is generated, when the "RY" Control waveform goes low inhibiting Gates U2a and b, and setting Q of U1 high. It will be noted that in the example, another "Y" is required in slot 7

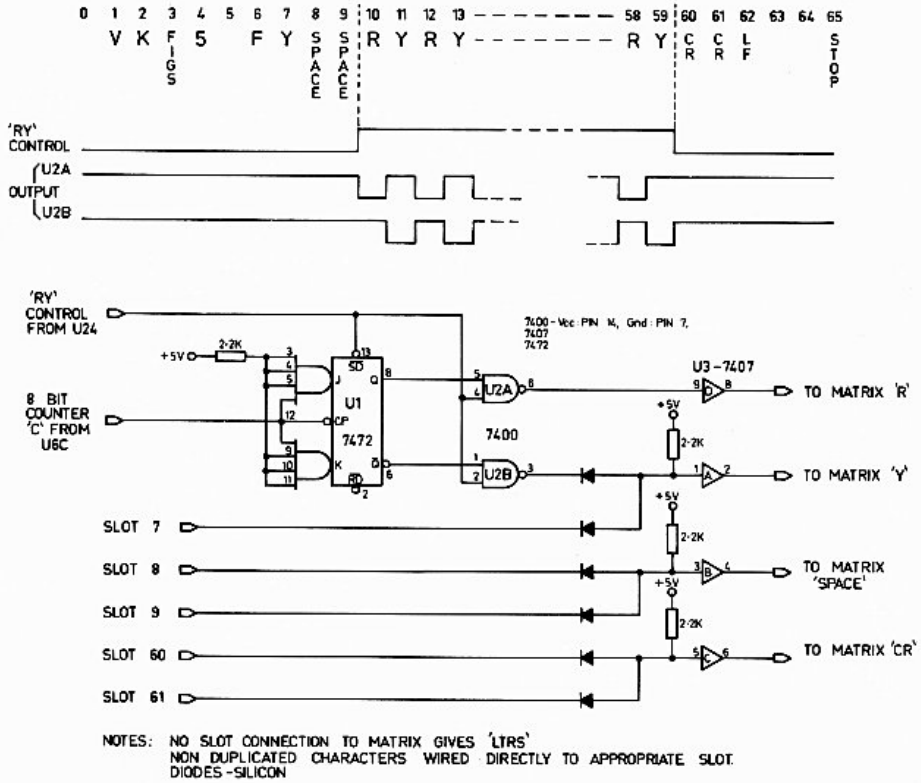


FIG. 6. "RY" GENERATOR.

. . . part of the Call Sign. The paralleling of slot 7 to the "Y" output of U2b is accomplished via the 2 diode gate and the non-inverting buffer U3a. In a similar manner, slots 8 and 9 are parelleled for Space, and 60, 61 for Carriage Return.

LINE GENERATOR BOARD (Using NAND Gates as the parallel slot combiners)

At the top of Figure 7(A) is a typical line message to be generated. Having decided the message format, it is necessary to note the number of times a particular character or function is repeated. These are shown on the diagram. From this information it is possible to determine the required number of Gate/Inverters combinations. As an example, the letter "C" appears three times, in slots 2, 5 and 8. A 3 input Gate has its 3 inputs wired to the appropriate slots, and its output passes via an inverter to the "C" input of the Matrix. Any low appearing at the input of the Gate will appear as a low at the output of the inverter.

An alternative, and possibly more attractive (expense wise) method of doing the same thing is shown in Figure 7(B). In this method, diodes are used as the gates, with a non-inverting buffer following them. In this case, only two packages are required, each one containing 6 non-inverting buffers.

It is therefore possible to make a number of different line messages, and have them available to plug in as required.

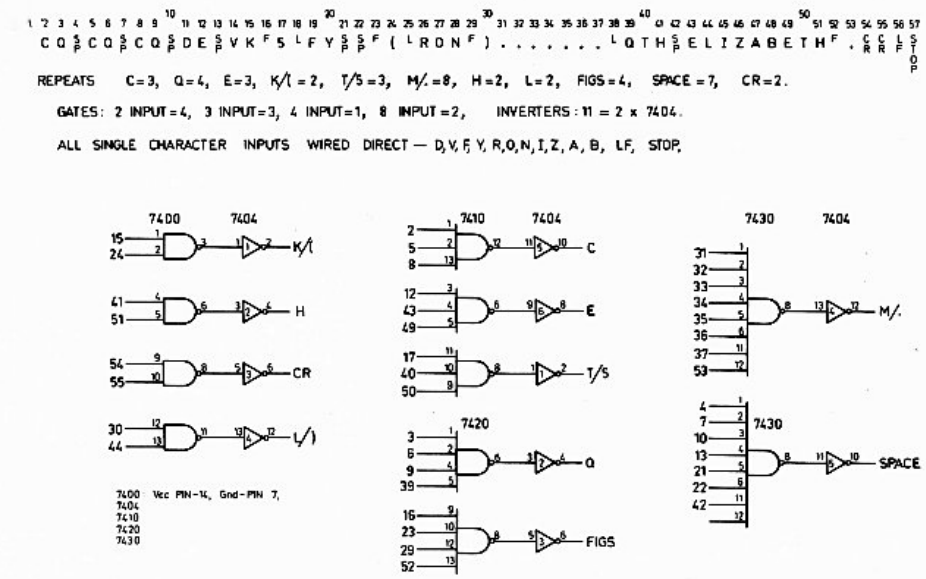


FIG. 7A. LINE GENERATOR — EXAMPLE (USING GATES).

CONSTRUCTION

The Code Generator and Control section, plus the diode Matrix were constructed on one 6 by 4 inch board, and were hard wired. A similar board contains the Slot Generators, the two boards were then mounted back to back, with half inch spacers separating them. There is a lot of wiring on the boards, but it is very repetitious, since in the case of the Slot Generators there are 7 pairs of similarly wired devices. The matrix inputs, and the Slot outputs were then wired to the 100 pin socket. The unit requires about 800 milliamps at 5 volts. As C-MOS devices become cheaper, and more plentiful, a considerable power saving could be achieved by using them. The facilities on the box containing the Generator are:

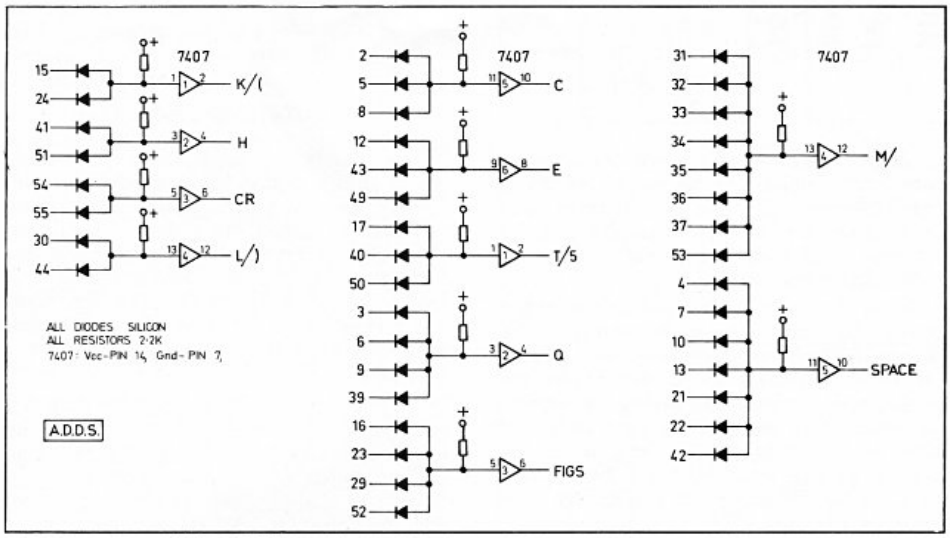


FIG. 7B. LINE GENERATOR — EXAMPLE (USING DIODES).

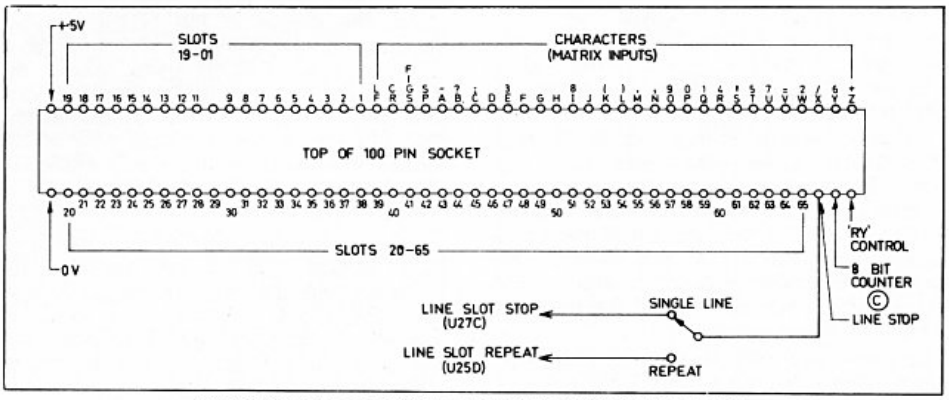


FIG. 8. SOCKET LAYOUT FOR GENERATOR BOARDS.

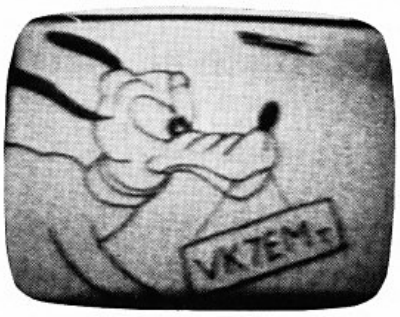
AC on switch, a 3 position switch, which in the central position is the Line Stop condition. In one direction, a single line only is transmitted, and in the other the lines are repeated until the switch is thrown to the central position. The only other control provided is a Stop button, which will cause the unit to reset as soon as it is actuated. A Led indicator connected to the Code output via a transistor, shows that power is on, and whether the Code is being transmitted. The Led is illuminated in the Mark condition. ■

ATV-DX

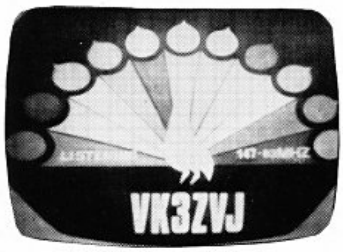
Kevin J. Callaghan VK3ZVJ
34 Gordon Grove, East Preston, Vic., 3072

On Thursday, January 27th, at about 1930 EA Summer Time, VK7EM Winston of Penguin, made his annual appearance on Channel "V" 147.63 MHz, the Melbourne ATV group liaison frequency.

He was answered by Peter VK3BFG and Kevin VK3ZVJ. Winston then put up a 10-15 watt Video signal on 426.25 MHz. This was seen by the above two Melbourne stations. Ron VK3AKC then joined the net. Two way pictures were then confirmed between all stations. The 2M signals peaked to S9, and the 70 cm Video signals peaked to about S4 on the BATC scale. Winston then went QRT from about 2030 to 2200.



VK7EM AS RECEIVED BY VK3ZVJ IN PRESTON.



VK3ZVJ STATION IDENTIFICATION SENT TO VK7EM.

During the second contact two way pictures were confirmed between VK7EM and VK3BFG, VK3ZVJ, VK3ZU and VK3ATY. Bob VK3ZU's contact was worth noting as he was only running 600 mW of Vision on 70 cm.

Signals were received from as far west as Keilor to as far east as Wantirna, peaking at some QTH's and at the same time fading at others.

ABOVE: IAN VK3ATY IN CONTACT WITH VK7EM.

BELOW: VK7EM RECEIVED BY THE MELBOURNE ATV GROUP.

Vision signals held up until about 2345 when all parties gave it away for the night.

On Friday night VK7EM's vision signals made a short reappearance but no 2M signals.

On Monday night, 31st January, two way 70 cm vision contacts were made between VK7EM and VK3ZVJ.

How about some more VK7 ATV activity and some Mt. Gambier ATV activity, Melbourne stations are looking for you. ■

RADIO TELETYPE

PART FOUR

Jostein Gjerde, LA7MC

BUILDING AN RTTY DEMODULATOR

To achieve the best performance possible with RTTY it is necessary to construct a more complex demodulator than the one described in the preceding part of this series. This article discusses the design features of different types of demodulators.

KEYING BANDWIDTH

A constant carrier wave without modulation comprises only one frequency. It has no bandwidth. But as soon as keying is used, this is no longer true. The signal now becomes pulse-modulated and the bandwidth depends on how fast it is keyed. Fast CW gives a wider signal than slow CW, ordinary CW consists of off/on pulses and this gives one form of AM.

If the pulses are of completely rectangular form, the modulation will, theoretically, have an infinite number of harmonic frequencies, all a multiple of the keying speed.

It can be shown, mathematically and practically, that when one uses 60 words per minute on teletype (50 baud) the keying speed is 22.2 Hz. Since the key signal has sidebands on either side of the carrier wave, the total bandwidth for this keying speed is 45 Hz.

FILTERING AFTER DETECTION

The detection of RTTY signals changes the signals to separate DC pulses (usually plus and minus) for mark and space. The rectified low frequency component is still present in the detector output signal as are all types of noise and beat tones which have bypassed the channel filter and limiter. In this way, a low pass key filter with minimum bandwidth coupled after the detector will give an appreciable improvement in signal to noise ratio. A single RC filter which is used in many of the common demodulators for amateur use will effectively eliminate the low frequency component, but the roll off rate is too poor for the filter to do a really good job. One uses, therefore, an LC filter in rather more expensive converters and recently, amateurs have begun to use active filters in, e.g. the ST-6. Such a filter should theoretically be set for a boundary frequency of 22.5 Hz which is the keying frequency but practical limiters use one a little broader, mostly 28 Hz.

THE SLICER AND LIMITER

This is a circuit which swings between saturation current and complete cut-off with a relatively small variation in the input signals amplitude. The range of input voltage variation which allows the slicers to operate effectively depends on the slicers' dynamic range. If one uses a pre-limiting stage first, these voltage variations will not be so large. Therefore, the dynamic range of a slicer in a demodulator with limiter need not be large; 20 dB is more than enough. If a modulator is used to receive different shift widths without retuning the filters, a greater dynamic range will be required.

Since the teleprinter mechanism needs on/off DC pulses to work correctly the slicers ability to go from full power to total cut-off at maximum speed will govern the teleprinter's operational ability to receive correctly. The slicer is a very important part of the demodulator and it is important to use well regulated DC current to it. A Schmitt-trigger is the circuit most used as a slicer.

MARK AND SPACE FILTER

Since the transmitted frequency shift signal is a type of frequency modulation, we can treat it as FM in the demodulator. We can also treat it as an AM signal (if you neglect the limiter stage).

If the signal is strong enough so that the limiter comes into operation, the limiter's output voltage will be of constant amplitude. If the mark and space signals coming from the receiver are of the same voltage, one can use a fairly narrow filter before the limiter without introducing too large a distortion because of the transient response of the narrow filter.

If the mark and space are dissimilar, as is usually the case, the limiter will give problems with a narrow filter if the minimum bandwidth filters (55-60 Hz) is used. The time error, because of the dissimilar levels in the limiter, will be too large when one of the two signals "fades" in relation to the other (selective fading). The answer to the problem is to use filters which are broad enough, so that the time error, for example, will not exceed 25 per cent under the worst relationship of selective fading. The distortion now received will fall within the machine's ability to write satisfactorily. This concerns only filters *before* the limiter. Filters which come *after* the limiter are not subject to the limiter's demand.

It is also usual to make pre-limiter filters broad enough to avoid the problem as it is necessary to have exact tuning if you are using a narrow band system.

Instead of using two filters before the limiter, it is usual to use one filter which is about 1 kHz broad (for 850 Hz shift). The filter allows each frequency that falls within these limits to reach the limiter and this allows one to receive other shifts than 850 Hz. Such a filter also has the advantage that it is cheaper than separate filters for mark and space. One must also mention that you can omit the filter before the limiter, but this puts great strain on the receiver's ability to filter out signals near the frequency (selectivity).

The channel filters which follow after the limiter can either be narrow or broad. This depends on many factors, such as which shift variation the demodulator shall control, pace and what type indicator shall be used to adjust the signal. Usually an amateur FM modulator uses a bandpass filter with 1 kHz bandwidth before the limiter and a single but effective filter after the limiter. This is often called a linear discriminator.

LIMITER

The limiter gives out a signal of constant amplitude. This does not mean that the limiter can separate the signal from noise which comes from the receiver. The strongest signal which reaches a limiter will "capture" it. All is well as long as the strongest signal is the required one, but if the signal fades down among the noise, the output of the limiter will be noise which the limiter is trying to raise to the same level as the signal heard. But if the mark and space filter which follow after the limiter are of similar bandwidth, the output from the low pass filter which follows the detector will be only a fraction of the voltage level under normal signal relationships.

This is because the positive noise — ouput voltage from the mark detector will try to balance the negative output voltage from the space detector since noise is present in both outputs simultaneously. The low pass filter will further try to eliminate noise variations.

When an interfering signal which is stronger than the desired one is present (e.g. a nearby CW station), the limiter will be captured by the stronger signal and try to suppress the desired signal. In this way, an interfering signal which is stronger and comes into a demodulator destroys all reception. This signal can be removed by means of a notch filter in the receiver which can then achieve normal reception. If the desired signal is stronger than the other signals at the frequency, it will effectively suppress all the other weaker signals and one will have good reception even though the other weaker signals are audible in the loudspeaker.

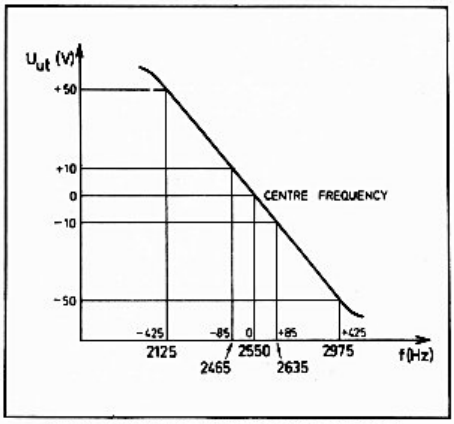


FIG. 1. LINEAR DISCRIMINATOR CHARACTERISTICS.

In this way, one can say that the limiter "capturing" effect can be both good and bad, depending on the strength of the desired signals in relation to the other signals and noise.

THE LINEAR DISCRIMINATOR

A linear discriminator (Fig. 1) gives out plus and minus voltages which are proportional to the divergence from the centre frequency where the output voltage is zero.

If the mark and space filters are made with a suitable Q value, such that the edge steepness is reasonable, it is possible to get a linear discriminator curve.

If the output voltage is plus or minus 50 volts for 850 Hz shift, the output voltage for 170 Hz shift will be plus or minus 10 volts. If the dynamic range of the slicer is such that the mechanism will continue to operate at lower voltages than plus or minus 10 volts, this will make it possible to receive a broad range of shifts without changing filters. If the dynamic range of the slicer is sufficiently large, one can receive shifts of only a few hertz, if one manages to adjust the receiver exactly enough. With such a system it has been possible to receive shifts as low as 4 Hz, but this is of little practical interest.

It must be clear that a discriminator curve as shown in the diagram will have a maximum signal to noise ratio when the shift is exactly 850 Hz. But as long as the incoming signal is stronger than the noise level this does not matter precisely. To make a good linear discriminator, you must have a low Q value in the tuned circuits. Most used today are 88 mH coils wound on toroid cores and these coils will give a fairly high Q value for this purpose. It is therefore necessary to damp the circuits by means of parallel connected resistors.

DEMODULATOR WITHOUT A LIMITER STAGE (AM reception, Fig. 3)

Many things can happen to the RTTY signal between the sender and receiver. One of these phenomena is selective fading, and consists of the mark and space signals fading in different ways. It is possible that one of the two tones can fade down toward the noise level by itself for a short time. Ordinary demodulators cannot always deal with this situation, and one will get many printing errors until both mark and space signals lie above the noise level. The relationship can be much improved by using a so-called "threshold corrector". But the limiter stages have a tendency to strengthen the noise and without a good low pass filter it can be difficult for the threshold correction link to work as it should.

If you do not use a limiter stage, you can use a filter with minimum bandwidth of 55-60 Hz. This gives a very small bandwidth and with powerful QRM from nearby stations one can get a great improvement in reception. But this gives new problems. Firstly, it can be difficult and expensive to make such a sharp filter. In addition the smallest error will cause considerable distortion from the filters, and it is very easy to lose the signal. If the shift at the transmitter station is not exactly 850 Hz (this is seldom so) such sharp filters will not work. It is also difficult to know when the receiver is correctly adjusted. Limiting cannot be used and the tuning dial gives only a rough indication. The signal can either have drifted frequency or faded out. Frequency corrections of 10-15 Hz are in addition a difficult matter with most receivers.

The mark and space signals can be compared with two independent transmitters sending out the same information.

For AM reception one does not use a limiter. Selective fading leads to the output voltage from the two detectors varying greatly from moment to moment, dependent on whether you are receiving mark or space. In FM demodulators this will be dealt with by the limiter. In AM demodulators, the threshold correction circuit must do the same job.

This circuit must supply the following stage (the slicer) with signals that are the same for mark and space. This you achieve by using a storage condenser to even out the output voltages. In this way the slicer will receive the same information for mark and space even if the signals vary mutually in amplitude within the circuit. In one moment it can have plus or minus 60 volts for mark/space and in the next only plus or minus 6 volts.

It is this quality which makes it possible for a good AM demodulator to work well on weak signals, particularly when one of the signals disappears in noise every now and again.

It is also this function which makes it possible for an AM demodulator to receive only one tone when the other is buried by noise or interference (usually in such circumstances one must have the ability to switch out one channel).

There are many variations of couplings for such threshold correction circuits.

One type is called Decision Threshold Computer (DTC). This type is used in the Mainline TT/L2 demodulator. Another type as used in the ST/6, is called Automatic Threshold Corrector (ATC). Slide back detector is another name for the same circuit. Threshold correction circuits are used nowadays in both AM and FM reception. When used for FM reception, the object is to correct for wrongly tuned or drifting signals, whereas the AM reception they serve to give a correct reference level of mark and space signal when these vary mutually in amplitude. 2AM reception is superior when there are powerful stations close to the frequency. Conversely, FM reception will allow the greatest variation in shift and variation because of drift, etc., will be most acceptable when there is little QRM.

COMBINED AM/FM CONVERTER (Fig. 4)

As earlier mentioned both AM and FM reception have their advantages and more expensive converters are made these days usually with facility for both types of re-

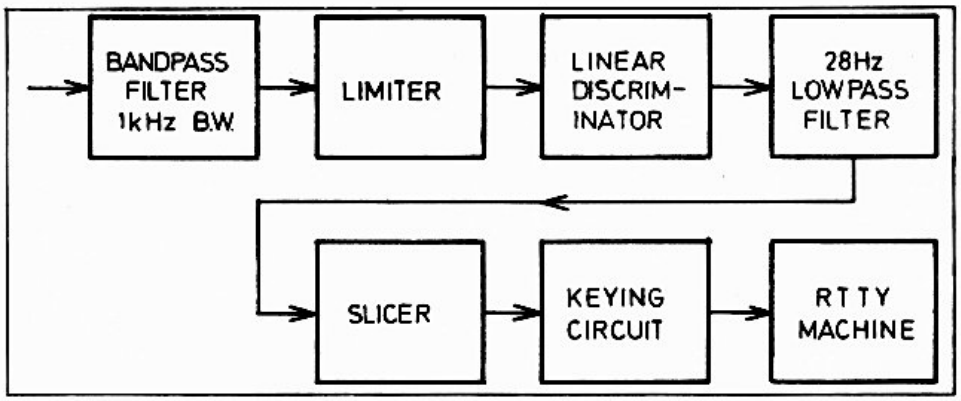


FIG. 2. FM RECEPTION OF RTTY.

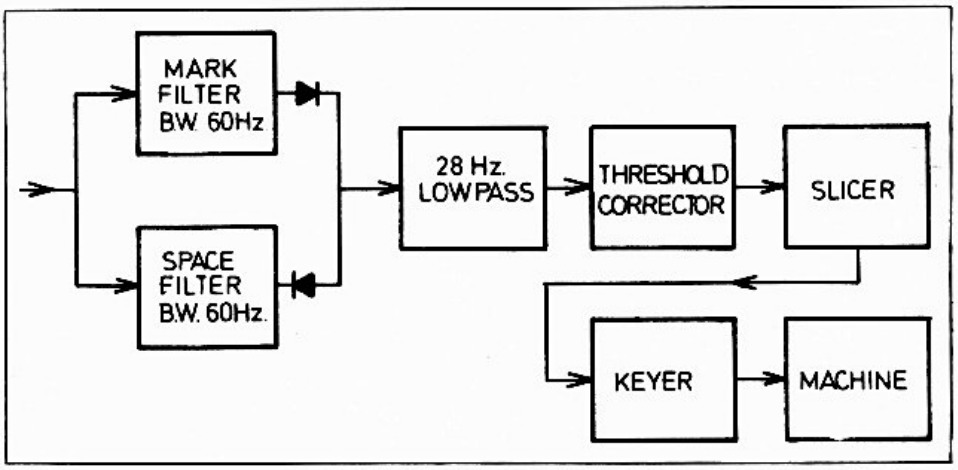


FIG. 3. AM RECEPTION OF RTTY.

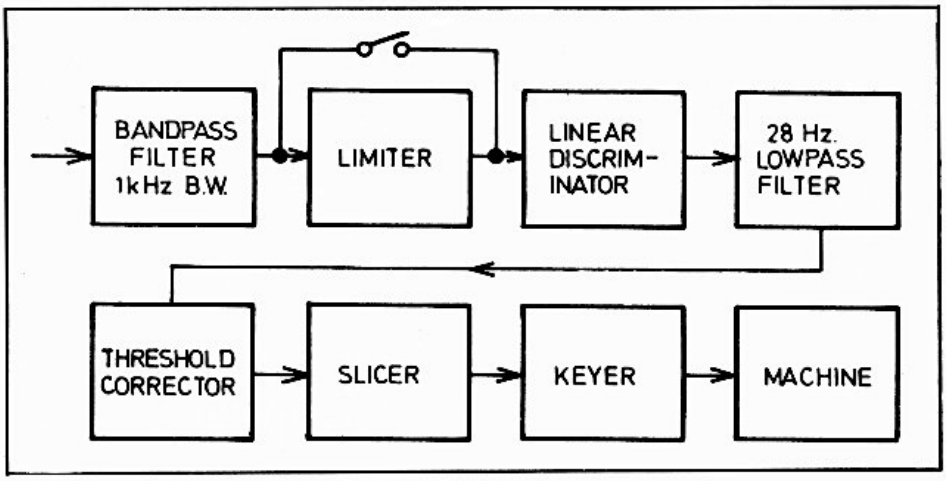


FIG. 4. COMBINED AM/FM CONVERTER.

ception. This is mainly done by being able to couple in or out the limiter circuit. Also, one retains the threshold correction Available in FM reception and uses the band pass filter in the input with AM. The latter can be rather doubtful; one would get useful advantages with AM better if you used a narrower filter here even though it would set greater demand for correct shift and drift freedom.

VALUE OF FREQUENCIES IN RTTY CONVERTERS

It is frequently recommended to use frequencies 2125 and 2975 Hz for mark and space respectively in converters. When occasionally, because of high frequency narrow filters in transceivers 1050 and 1900 Hz are used, you must consider this as an emergency solution.

There is an assumption that signals in one channel will give signals in the other channel. If you send a strong signal on the 1050 Hz mark channel, which has perhaps previously passed through a limiter step, the second harmonic will be fairly strong. That is to say, you have a strong signal on 2100 Hz which is only 200 Hz from the space channel. If the filter is not very sharp, this frequency can easily get into the space channel when it certainly should not. If you had chosen 850 Hz as the lower frequency, the second harmonic would have been accepted by the other filter and this would be completely objectionable.

Other details not directly connected with reception:

AUTOSTART OR AUTOPRINT

The autostart system has many variations; the main purpose is to provide key signals to the machine and start the motor when the converter receives the RTTY signal and only then. This makes it possible to set the receiver to respond to a chosen frequency. and set off reception when RTTY is received. It must not react to noise, CW or telephony signals. These demands, one must say, are only partly fulfilled by existing systems.

ANTISPACE CIRCUIT

If you receive a signal coming in on a space tone, the machine will stop and chatter. This is unpleasant to listen to and will lead to a mass of overprinting on the paper. This may well happen frequently. If you take, for example, a sweep of the 80 metre band in the evening, there are carrier waves almost everywhere. It is therefore normal to build in a so-called ANTISPACE circuit, which ensures that the converter goes "mark-hold" (current), when the space channel is supplied with a continuous signal. This circuit must naturally not operate if it acts upon a true RTTY signal. ■

(To be continued)

CB - "WALL TO WALL AND TREE TOP TALL"

Al Shawsmith VK4SS

Man is a co-operating social animal: he also has the universal talent to spoil any good thing. The CB operation is no exception. It started out in the States, in 1947, as a facility for the benefit of ordinary citizens needing assistance of one type or another. The service never really took on until the early 1960s when, in the Deep South, CBers began to multiply like a fast breeding virus. It spread to the lower West Coast and back across the USA to the NE areas. By 1970/1 they numbered approximately 1 million. In 1976, the figure was put at 6.2 million: and now a letter from Prose Walker, W4BW, the FCC man, dated early January 1977 says, and I quote, "We have about 8 million licensed CBers and God only knows how many *illegals*! The FCC has expanded the band from 23 to 40 channels and is thinking of another band at 220 MHz for them — *shared with Amateurs*!" This means that at the present rate of expansion there will be, in 1978, CBers equal to the population of Australia.

But that's only the beginning. The FCC envisages 60 million in the USA in the near future; one for every three or four persons. That's about as close to saturation as one can get. It is estimated that almost half a million per month are now applying for licences. Fill in a simple form (often falsified), pay a fee of $4 and your permit for as many sets as you wish is valid for 5 years.

There is approximately one CB inspector for every 100,000 users, plus the illegals who naturally won't stand up to be counted. This is like allotting one single doctor of medicine to each small city. He hasn't a hope in hell of coping. So the violations grow and the pirates proliferate. One magazine publishes a list of violators and the penalties incurred: $75-$100 is the average fine. The deterrent value of these amounts appears to be minimal.

It is illegal for CBers to QSO over a distance of more than 150 miles. However, reports to hand show that they are buying higher power gear, such as SSB Ham transceivers and hi-gain beams: all in the hope of putting out an S9 DX signal when skip is right of 1,500 miles. So much for the FCC regulations.

So, what started out after WW II as community help and service to travellers, has now grown into the greatest communication pollutions nightmare ever. CB operation seems to follow the rule of Murphy's law: if an electronic gadget can be QRMd, a CBer will do it.

An ABC news correspondent reporting on an "AM" session, described the "stuff" (CB QRM) as pouring out of every conceivable piece of household and business electronic equipment in the country. A little exaggerated maybe, but such a situation could well be near at hand.

Stories of interference are endless. They range from the bizarre and near disastrous, to the funny. Householders, driven to distraction, have formed themselves into groups and simply put the offenders off their air by tearing down antennas, or rendering sets U/S. Others have sold up and moved to the cities outskirts, only to find, to their horror, that the same problem exists.

One of the more humorous, that won't singe the pages of this magazine, might bear telling:—

A minister was delivering a sermon on the decadence of sexual permissiveness, when, from the church's electronic organ came a female voice, wail to wail and tree top tall*: "Hi there, boys, this is Rosie; I'm free right now; you got my 10-85 OK (pad No.). Why don't ya come up and see me sometime?"

Soliciting from an armchair sure beats accosting on a street corner.

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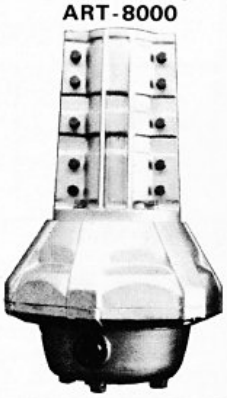
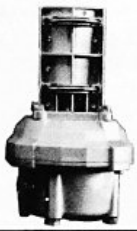
AIGA ROTATOR SPECIFICATIONS SUMMARY

MODEL NO.	ART-8000	ART-3000
Rotating Torque	2,500kg/cm	850kg/cm
Braking Torque	10,000kg/cm	1,700kg/cm
Maximum Vertical Load	2,500kg	250kg
Control Accuracy	±5°	±5°
Drive Type	Gear	Gear
Power Requirements	(May be modified upon request.)	
Operation Temperature	−40°~+80°C	−40°~+80°C
Forward/Reverse Delay	3 seconds	3 seconds
Maximum Continued OP	20 minutes	3 minutes
Mast Clamp	48φ~78φ	34φ~55φ
Cable Requirement	9 conductor	8 conductor
Net Weight	26kg	5.7kg
Shipping Weight	27.5kg	6.5kg

ART-8000



ART-3000



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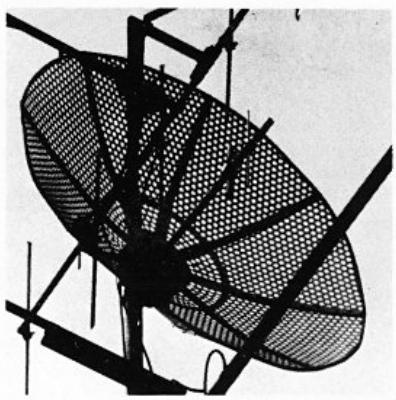
Front to side ratio※	over 40dB	over40dB
VSWR	1 : 1.3	1 : 1.3
Input impedance	50Ω (N-type)	
Maximum input power	1KW CW	
Maximum wind survival	50m/sec	
Dish diameter	1.2m	
Net weight	4kg	

※Horizontal polarization



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IC22S 2M FM SYNTHESISED

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It's an ill wind that benefits nobody. To accentuate the positive side of CB, it must be said that the Channel 9 emergency service is a facility whose value is beyond measurement. Any US citizen travelling by car would rather leave his spare tyre at home than his CB mobile. Unselfish teams of operators, numbered in tens of thousands, monitor Channel 9 twenty-four hours a day, providing assistance to broken-down motorists and any other emergency. Thus, all of the States and part of Canada is covered by a protective umbrella of service and succour.

Another positive facet of CB is its ability to dispel loneliness and boredom for the women in the house who suffer from that cut-off, isolated feeling. Thousands of housewives claim to have talked out their neurosis through their set. (Pity the listener at the other end.) But, perhaps its greatest service is to bring the chatter-natter of the outside world to that vast army of handicapped, invalided and bedridden souls whose horizons are the four walls of their room.

Italy, Brazil, Venezuela, Canada, Jamaica, Colombia, all have CB operation. Even Russia has it after a fashion — illegally. The following snippet titled "(Radio) Happenings in USSR", appeared in AWA's reputable OTB:—

"Illegal broadcasting by home-made transmitters has become a persistent and growing youth cult in the Soviet Union. After samizdat (clandestine publishing of dissident writings) and magnitizdat (circulating tapes of unorthodox poetry and music) there is now radioizdat — air-it-yourself programmes of pop music, teenage talk, messages to girlfriends and even dirty jokes. All of which represents a somewhat refreshing contrast to official state-controlled broadcasting, which is apt to be long on lectures about beet growing and the life of Lenin, but short on entertainment.

In the Ukrainian city of Donetsk (population 900,000), youthful would-be dee-jays adopted such sprightly call signs as 'Buzz Saw', 'Green Ghost', 'Graveyard Goon', 'Bullet Hole', 'Spark of Love' and 'The Invisible Man'. The police were not amused. In an effort to make a clean sweep of the cluttered airways, 1,000 amateur Donetsk broadcasters — called 'organ grinders' by the police — were arrested and fined 50 rubles each ($70) for 'violating rules governing the use of radio frequencies'. There have been similar efforts to clamp down on underground broadcasting in other major cities."

The question of banning CB, as advocated by some, is polemic no longer: it's now almost academic. The clay heads, i.e. the ordinary unskilled (in radio) populace have, with the help of science and technology and mass production, claimed what they see as their rightful heritage. In one form or another, legal or illicit, for better or worse, CB, like sex, beer and racehorses is here to stay.

CB, in spite of its population explosion, is still in its early growing pains, worldwide. No one yet knows if it will turn out to be a threat to AR, or a good thing ruined — or, through self-regulation, become a cohesive beneficial social facility. Only time will tell; but, what ever face it assumes, it will, like the telephone, change the way of life for 20th century man. Eventually, its effect will be felt in almost every home. Some of its esoteric jargon will roll off the tongue of the man in the street — and be printed in the nation's dictionaries. ■

TRANSITIONS IN COAXIAL LINES

Alan Moritz VK3ZHU
4 Dugdale Street, Bacchus Marsh, Vic., 3340

A common requirement for amateurs operating on 144 MHz and above is a broadband, low VSWR connection between coaxial lines of different sizes with the same characteristic impedance.

This situation arises, for example, where rigid coaxial lines[1] or test equipment such as directional couplers[2] are used. Although a tapered transition[1] can be used, this approach presents problems for amateurs without access to a lathe and is in any case inconvenient at the lower frequencies because of the length of the taper.

An alternative approach is to provide an offset between the steps in the outer and inner conductors which give sufficient inductance to compensate for the excess capacity in the transition region (Fig. 1). This problem has been examined experimentally by Kraus[3] and on a theoretical basis by Green.[4] Table 1 shows the required values for line impedances of 50 and 75 ohms with air as a dielectric, which, for amateur purposes, are not significantly different. As the problem of calculating the offset required for 50 ohm lines with teflon as a dielectric is equivalent to calculating the offset for a 71 ohm line with air as the dielectric, the figures can be used to estimate the offset required for connectors such as type N. Although the data only apply to coaxial lines, some experimental results indicate that they are at least approximately correct for other types of transition, e.g. the transition between a RG58AU connector and a parallel plate line (circular inner conductor) with a spacing of 0.8 in. requires an offset based on Table 1 of 0.09 in. The figure determined experimentally[5] is 0.11 ± 0.02 in.

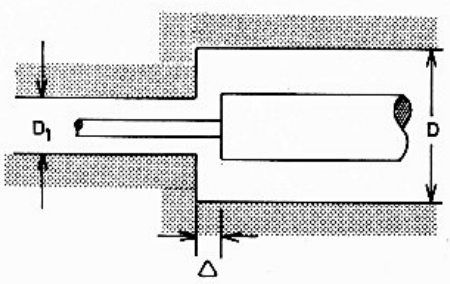

TABLE 1

D/D_1	Δ/D_1	
	50 ohms	75 ohms
1.2	0.055	0.065
1.4	0.055	0.065
1.4	0.105	0.12
1.7	0.165	0.17
2.0	0.215	0.22
2.5	0.29	0.295
3.0	0.35	0.36
3.5	0.415	0.42
4.0	0.475	0.48

REFERENCES

1. Sandorf H. N., Amateur Radio, **38**, 12 (1970).
2. R.S.G.B. VHF-UHF Manual.
3. Kraus, A., Rhode and Schwarz Mitteilungen No. 8 (1956).
4. Green, H. E., Advances in Microwaves, Vol. 2,327 (1967).
5. Moritz, A. G., Blurb, Vol. 1, 4 (1972). ■

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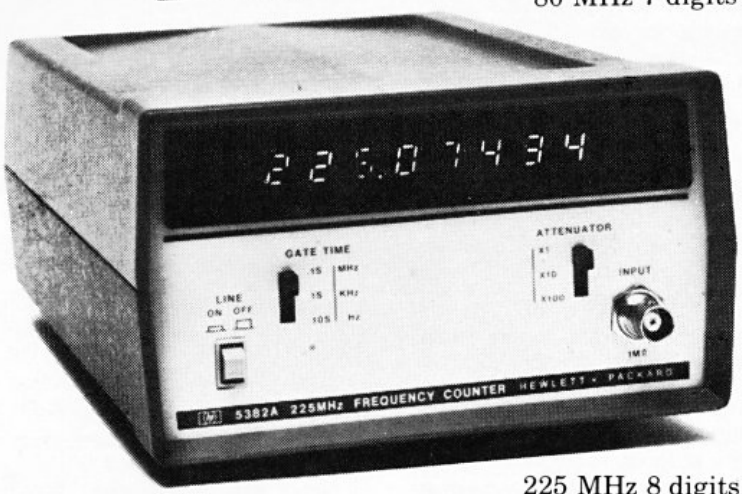

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FORTUNE 30801

MAY 1976 WA6LET TESTS

Article provided by Roger Harrison VK2ZTB

In January 1976 we were making plans for a 1296 MHz EME test at the SRI 150 foot dish. However, by March it became apparent that the 1296 MHz station and feed were not going to be ready in time. Conducting the tests during the summer was ruled out for a number of logistical reasons, and thus we decided to test on 432 MHz again; but to add a number of scientific tests that would demonstrate the characteristics of the EME communicaions path.

A 20 kW klystron amplifier, used for Government research, at the site could be returned to 432 MHz. This power level would bring EME reception within the range of most 432 MHz DX enthusiasts. It is not practical to use it for two-way communications due to the long time required to bring up the operating voltages. Since the beam current cannot be switched off otherwise; it approximates a 50 kW noise diode. Besides, you can't work em if you can't hear em! One-way propagation tests consisting of two minutes of A0 operation for chart recording the signal strength VS time; 50 microsecond pulse transmissions (at a stable 50 PPS rate) to allow measurements of pulse dispersion; and CW groups sent at variable power levels were planned.

A letter requesting special temporary authority (STA) for these tests was sent to the Federal Communications Commission. Permission to use the 150 foot dish was also requested of SRI and the U.S. Government, and announcement letters were mailed to the 432 MHz gang.

We then considered the possibilities of running on other "new" bands simultaneously with 432 MHz. We had already committed ourselves to running 432 MHz and high power. This meant using the circularly-polarised horn and its six-inch coax feedline. Nothing could be placed in front of the horn. This ruled out 1296 MHz, but it looked like feed antennas for lower frequency bands like 222 MHz or 144 MHz could be placed around the sides of the horn and still illuminate the dish properly.

Sketches that we had used in making the 144MHz feeds used earlier indicated that the mouth of the feed horn was 39 inches in diameter; about ¾ wavelength at 222 MHz, a bit wider than desired (½ wavelength), but perhaps still useable. And so, we decided to add 222 MHz. Two 2-element rear-fed yagis were constructed for a 222 MHz linearly-polarized feed. Equipment was located and borrowed; the exciter and receiver from Karl Lind, WB6TJO; and an 8877 amplifier from Louie Anciaux, WB6NMT.

The week before the test involved a lot of long hours by WB6KAP, WB6TJO, K6OJM, W6YFK, and WA6KKK:

Monday/Tuesday: Built cavity filters for 222 MHz, tested feed impedance of 222 MHz feed — shortened elements to resonate.

Wednesday: Called W1SL at ARRL, "No word from FCC yet, could he check and see who we should call to check on our STA?" Decided to go ahead on the assumption that we had not gotten approval for 20 kW or pulse operation. Took gear up to dish Wednesday night. Since the dish was not being used the rest of the week we could start installation.

Thursday: Mounted 222 MHz feed on the side of the 432 MHz horn. Mounted preamps and changeover relays inside equipment rack at apex in back of feed. Connected equipment.

Friday noon: Tested systems on moon. Echoes were received on 432 MHz but not on 222 MHz. Took feed down, and checked front-to-back ratio (was about unity). Adjusted reflector length to bring front-to-back ratio up to 10 dB.

Friday afternoon: Finally got through to Gary Hendrikson at FCC. He indicated that "Yes, our request for an STA had been approved and sent to the typing pool. Unfortunately it had not been stamped urgent/rush; and the typing pool was swamped".

Unfortunately it was too late to get the SRI engineer-in-charge of the klystron up to the dish to retune it to 432 MHz; and it was needed where it was the next Monday.

Re-installed the 222 MHz feed and worked a number of stations in the Los Angeles area (350 miles) with the dish parked in that general direction. "System must be working — loudest signals anyone had heard out of LA on 222 MHz; and with the radar on too!"

Sunday (very early): "The radar QRM was off, nothing could go wrong!"

Moonrise (1000 UT): Conducted first A0 and variable power tests on 432 MHz (1 kW down to 25 W in 3 dB steps).

1014 UT: First contact on 432 MHz, F9FT. No echoes were being heard on 222 MHz.

1036 UT: Worked K6JKQ on 222 MHz (in Stockton, about 60 miles away), who gave us a 339 report. Since he was 599, we started looking for trouble; and found that the reflected power was up. The antenna changeover relay (mounted at the feed) had failed. Suspended operation on 222 MHz except for listening.

Telephone Calls: "Is WA6LET on 222 MHz?" We never dreamed of the number of stations having almost-EME status on 222 MHz. We didn't hear any of them. After a hurried conference we decided to lower the feed and investigate after sunup.

1400 UT: A0 and variable power tests on 432 MHz. We had missed the scheduled 1200 UT test trying to get the 222 Mhz system working.

1430 UT: Activity slackened off on 432 MHz. The feed was lowered and half a dozen engineers charged out into the brisk morning air with the tools of their trade. They checked cables, fittings, lines, noise figures, and swept the system; discovering that the voltage drop in the line carrying power to the antenna relay coil was sufficient to keep it from closing completely. Raised the supply voltage to 36 volts — and voila, success! Raised the feed.

1530 UT: Back on the air, but still no echo on 222 MHz.

Telephone call from WA5MFZ (XYL of W5LO): They were hand-steering a 28 foot dish lying in their driveway and the moon had just passed out of range. "Would it help if I cried a little?"

1800 UT: Last A0 and variable power test had missed 1600 UT.

1924 UT: Last contact on 432 MHz with JA1VDV, who could not copy our SSB.

1930 UT: End of tracking tape. Dish stopped. Our 432 MHz echoes got stronger, then weaker. Last echoes heard at 1935: 30 UT.

During 8½ hours of operation, WA6LET made 64 two-way contacts on 432 MHz with 53 different stations in 12 countries and 14 States. Of these, five contacts were made on SSB voice. Twenty-eight of the station calls were new to WA6LET on 432 MHz. Below is a list of the station calls worked/heard. An * indicates incomplete contact, † indicates SSB voice contact.

AC1JAA,* WB2GLQ/1, K9AQP/1, K2UYH†, K3SWZ, K3WHC, K3PGQ, K3PGP, W3TMZ, W3CJK, W3CCX, W4FJ, K4VOW, W4NUS, K5LLL, W5HN, WA5IPI, WB5LUA, W5AJG, WA5WCP/5, K5CE,† WA5MFZ, W6ABN, WA6EXV, WA7BBM, WB7BST, K7GZB, WA7AZY,* K9ZGT, WA9HER, W9WCD, K9ZUI/9, WA0FLS/KL7, VE3ONT,

SRI 150 ft. DISH IN THE TESTS.

VE7BBG,† F1FG, F8KJ, F9FT, F2TU,† F5SE, F6CBC, F8QD, F3NQ,† I5MSH, JA1VDV, JA1ATL, JA9BOH, JA0PX, LX1DB, LX1FX, OK1KIR, ON4DY, PA0LMD*, PA0SSB, SM5LE, VK3ATN, VK5MT,* OZ9CR.

In addition, we have received reception reports from the following stations:

WA5IOD/1, W5LO, W7QID, K9ZZH, VE4MA, VE4AS, F1AQC, F6APU, G8AXU, I2KBD, I8CVS, JA1AUH, JA5AOG/3, JH6EQD, JA6CZD, JA0AIF, VK2AMW, VK5ZPS, XE1RCP, ZE5JJ, JA4BLC.

Operators for the May 23, 1976 test at WA6LET were: Victor Frank WB6KAP, Douglas Westover K6TZX, Karl Lind WB6TO, Ronald Panton W6VG, Glenn Tomas WA6KKK, Arne Gjerning K7CAD/6, Brian Westfal K6OJM, Loren Hodapp WA6BMR, Jack Trollman WB6JZY, Douglas Beck K6ZX, Cliff Buttschardt W6HDO, Paul Schuch WA6UAM, and Steven Mieth W6YFK. Dish operator was Bob Foss WA6DIA.

We would especially like to thank.

1. SRI and the U.S. Government for the use of the 150 ft dish and 432 MHz transmitter.
2. Those stations who sent us tapes, charts, reports, and photos. These will become part of a summary technical article and a movie.
3. Those stations who, due to our operations, advanced their schedule for obtaining EME capability; for that's what it was all about.

POSTSCRIPT

A post mortem indicated that the 222 MHz feed antennas were spaced 49 inches, about one wavelength. It is now suspected that this wide spacing, combined with coupling between the feed elements and the horn and supporting structure messed up the pattern.

We should have (and would have, had we had the time) checked the pattern of the dish at 222 MHz to see if it was skewed or multi-lobed. The lesson is clear: you don't just go up to a dish, put in any old feed, and hope for the best, if you want to get moon echoes.

What is in the future for WA6LET at the SRI dishes? More of the same does not appear to be in the cards. The use of a half-million dollar Government-owned facility just to make more radio amateur EME QSOS is not considered good stewardship. We have already conducted tests on 144 and 432 MHz in April/May 1974, February 1975, November 1975 and May 1976. Any future moonbounce tests at the SRI dish must have something new. They may be on frequencies not used successfully before (like 50, 222, 1296, or 2304 MHz) or with new equipment or techniques such as were proposed for the May 1976 tests.

We will try to get more advance notice out so that everyone will have time to make preparations and get the bugs worked out. We cannot promise a "second chance" on the remaining bands, but would like to conduct EME tests on as many of them as possible between now and the World Administrative Radio Conference to be held in 1979.

Conducting these EME tests is somewhat like having a baby. There is some joy, some suffering, and a lot of work involved. About the same length of time is involved. "Two" per band is probably more than enough. ■

MAGAZINE INDEX

Syd Clark, VK3ASC

BREAK-IN November 1976
A 1926 Amateur Radio Station; Northland Branch 28; The Vern Roberts Story; Understanding FM; Mobile Refinements for the Climie Transceiver.

December 1976
Amateur Radio Emergency Corps; SAR Operations in the Tararuas; AREC Field Days; Emergency Radio Equipment; Looking Back; The Radio Emergency Scheme; Biological Pressures; Transistor Oscillators; A Simple Dial Marking Stencil; Notes on a Panoramic Monitor; Simple Impedance Bridge; An Outline History of Hornby Branch 56 NZART; A Simple Versatile Long Wire Array; Transformer Bridges; EDMD Keyer.

CQ MAGAZINE December 1976
Results of the 1976 CQ World Wide WPX SSB Contest; Why Radio Frequency Clipping; A Low Profile Three-Band Quad Mk. IV; The Famous 210 Tube: Its Birth, Life and Death; Power Input and Output.

QST December 1976
A Fast QSK System Using Reed Relays; Optimum Ground Systems for Vertical Antennas; Improving Earth-Ground Characteristics; The Log-Yagi Array; A Simple TTL Test Panel; Adapting the KWM-2 for Radioteletype Operation; PEP Wattmeter - a la Heath; Measuring Transmitter Power; FM-27B S-Meter; Oscar Goes to Schools; Is it Like CB, Mrs. Johnston; What's a Lysco Transmaster 600; The Rip Off; Marine Mobile Revisited; 5-Band WAS, the Hard Way; Checking into Slow-Speed Nets; W4OZF on No Name Key; Lonely Island.

RADIO ZS October 1976
Electronic Morse Keyer; An Active Filter for HF Transceivers; CW Sidetone.

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Improving the Outboard VFO for the FT75 and FL50; Low Cost 2M Colinear.

73 November 1976
Cordless Iron Tips; Bicycle Mobile; Build a Simple "Lab" Scope; Get on Six with Surplus; The Beam Saver; Updated Universal Freuency Generator; Who, Me? A Pioneer?; The Shirtpocket Touchtone; Put Your Name in Lights; Liquid Crystal Display Guide; Self Powered Mike Preamp; See the World and Get Paid; The Wind Counter; The S38 is not Dead; ID with a PROM; The Inverted L; Battery Chargers Exposed; How Do You use IC's; Thirty Years of Ham RTTY; Big Noise Burglar Alarm; Dandy Digital Dial Decoder; Weather Satellite Display Control; Ham Time-Sharing in Here for You; The Soft Art of Programming; Oscar Orbits on Your Altair; ASCII/Baudot Converter for Your TVT; The Smoke Tester; The Coffee Flipper; The Man Who Invented AC—Tesla; Baudot to ASCII; Baudot and Basic; Toward a More Perfect Touchtone Decoder; Using a Wireless Broadcaster; The Quiet Spy; The Benefits of Sidetone Monitoring. ■

NOVICE LICENCE SYLLABUS

The syllabus is almost wholly the one drawn up by Roger Davis VK4AAR, after consultation with VK2YA, VK2AKX and VK2AKH and others.

It is intended to submit this syllabus to the Radio Frequency Management Division during April. Comments on this syllabus would be very welcome but should be sent to the Executive office at once.

G. Scott VK3ZR,
Fed. Educ. Co-ord.

SYLLABUS

1. BASIC ELECTRICITY

The electronic structure of matter
Conductors and insulators
Current, potential difference, resistance
Electrical units
Magnetism
Permanent magnets and electro-magnets
Solenoid, relay, headphone
Other practical applications of magnetism as may be found in handbooks

2. DC CIRCUITS

Cells and batteries
The simple cell
Lechlanche or carbon-zinc dry cell
Wet cells, lead acid, nickel cadmium
Potential difference
OHMS LAW E = I.R
Resistors in series and parallel
POWER P = E.I.
Calculations of E, I, R, P
Voltage dividers, potentiometer and use as volume control
Internal resistance and regulation of voltage sources
Care of lead-acid batteries

3. AC CIRCUITS

Alternating current
Generation of alternating current
The sine wave and its generation
The importance of the sine wave "a pure frequency" to electronics
Average value of sine wave
RMS value of sine wave, power
Period and frequency of sine wave
HARMONICS, complex waveforms
ELECTROMAGNETIC INDUCTION
The motor effect
The generator effect
INDUCTANCE
Factors affecting inductance
Permeability of iron cores, and of ferrites
CAPACITANCE
Factors affecting capacitance dielectrics, properties
Practical choice of dielectric with respect to stability losses, voltage capability, capacitors in series and parallel
Inductance, capacitance, resistance
Reactance qualitative, IMPEDANCE
TUNED CIRCUIT — RESONANCE
The relation between "Q" and bandwidth
Acceptor and rejector circuits
TRANSFORMERS
General theory of operation
Energy transfer, impedance transformation
POWER TRANSFORMERS
Turns ratio, current/voltage
Losses: core and copper
Mains transformers: electrostatic shield

4. THE THERMIONIC VALVE

Thermionic emission, space charge, cathodes, conduction in vaccum
Characteristics of diode
The triode
Control grid
Amplification
Operation of triode as a Class A amplifier, bias load
Pentode, characteristics and comparisons — elementary facts only for Novice

5. SEMICONDUCTORS

Conduction in a semiconductor
Doping, the PN junction
Conduction and non-conduction
Reverse current-leakage
Diode characteristics
Germanium versus silicon
Variation in capacitance—"VARICAP"
Ratings of diodes, PIV
Current ratings of power diodes

6. TRANSISTORS

BIPOLAR TRANSISTORS
Control of current
Amplification
Leakage current
Bias stabilisation

7. AMPLIFICATION

AF amplification
Voltage, current, power gain
RC coupling
Transformer coupling
Preamplifiers, power output amplifiers
Class A, Class B, Class C
Class AB, AB_1, AB_2
RF amplifiers
Tuned circuit coupling
Application to sine wave OSCILLATORS

8. POWER SUPPLIES

Design of power supplies
Transformer ratings, power transformers
Need for filters, choke input filter, capacitor input filter
Size of filter capacitors
Zener diode and calculations
Voltage regulator tubes
Regulated power supplies

9. RECEIVERS

Definitions of selectivity
Basic receivers, crystal set
TRF set
Superhet design — mixers
Comparison between TRF: Superhet
Regenerative, Super-regen design
Single and double conversion — simpler than AOCP level
BLOCK DIAGRAMS of all designs
Automatic gain control — *function* of AVC only, not circuits
Beat frequency oscillator — but not product detectors
AGC or AVC Automatic volume control — the function and purpose of AVC, AGC but not circuits and not audio derived AGC

10. TRANSMITTERS

Generation of signal
Xtal oscillators
Amplification of RF
NEUTRALISATION, STABILITY*
PARASITIC SUPPRESSION*
HARMONIC SUPPRESSION*

* Knowledge of the existence of these problems. Full details of their detection not needed at this level.

11. MODULATION AND KEYING

Microphones, theory of operation, characteristics of carbon, dynamic, crystal, capacitor microphones
Methods of generation of
FM — Nothing on FM for Novice
AM — Modulation and low modulators
SSB — Elementary principles of FILTER ONLY
CW — Keying but not full-break keying
AM by low level, high level modulation problems to avoid, methods of measuring modulation percentage
Methods of generating SSB — a brief look at Filter
Filter*
Phasing*
Savings in transceivers
Station integration
Transmit receive switches
Antenna changeover systems

* A knowledge of the existence of the various methods but not circuits.

12. PROPAGATION

Nature and propagation of radio waves — elementary knowledge only

13. AERIALS, TRANSMISSION LINES

Relation between wavelength and frequency
Common types of receiving and transmitting aerials
Marconi quarter wave vertical
Hertz half wave horizontal
An elementary knowledge of

transmission line matching to achieve correct matching between TX and line, line and aerial
Use of SWR meter
Use of "DUMMY LOADS"

14. **TRANSMITTER INTERFERENCE**
Knowledge of the undesirability of harmonic radiation
Dangers of over-modulation
Low pass filters in feeder
High pass filters in TV sets

15. **MEASUREMENTS**
What accuracy means
DC moving coil meter
Voltage, current, resistance
Multimeter, digital multimeter
AC measurements, volts, amps
Wheatstone bridge for resistance
Resonant frequency of tuned circuits
The DIP OSCILLATOR
Frequency measuring
RF measurements — elementary
Dummy loads for transmitters
RF POWER
SWR meters
Measurement of power input to final stage of transmitter

16. **VHF and UHF**
Nothing on VHF or UHF for Novice.

17. **MATHEMATICS**
Arithmetic
Fractions
Decimals
Arithmetic with fractions
Arithmetic with decimals
The DECIBEL
Use of decibels

A. **THESE SUBJECTS SHOULD BE OMITTED FROM ANY NOVICE SYLLABUS:**
(These topics should be excluded from the Novice theory exam.)
(a) High Power RF amplifiers, modulators
(b) Variable frequency master oscillators
(c) Frequency modulation
(d) Pulse and other specialised modes
(e) Measurement of RF Power, Frequency measurement
(f) VHF and UHF and all topics connected with bands outside HF
(g) Transmission line theory

B. **ELEMENTARY DETAILS ONLY SHOULD BE REQUIRED FOR:**
(a) Propagation
(b) Aerials
(c) Power supplies
(d) Single sideband generation

Frequency measurement is a complex topic and while Novices have to be crystal controlled, the technique is to read off the printing on top of the crystal.

EXAMPLE

A question on VARICAPS as tuning diodes would be permitted. A question on the VARACTOR as a UHF tripler would not be permitted. Firstly because Novices are not to use VHF or UHF. Secondly the mechanism behind the action is complex — in fact, I have yet to see it in full AOCP, and what is the point of asking for names of devices a candidate does not understand. ■

ELECTRONIC ENTHUSIASTS EMPORIUM

POPULAR INTEGRATED CIRCUITS IN STOCK

CA3012	4.60	CD4026	3.30	CD4724	3.85	LM380N	2.75	MC1496K	2.75	UAA180	3.25
CA3013	5.80	CD4027	1.05	CD40097	1.80	LM381N	3.20	MC1590G	6.75	UA723C	LM723
CA3018	3.50	CD4028	1.80	CD40098	1.80	LM382N	2.60	MC14553	12.50	UA757	3.80
CA3023	6.80	CD4029	2.65	CD40174	2.90	LM387N	2.75	MC1648P	4.90	ULN2208	2.45
CA3028A	2.60	CD4030	.95	CD40175	2.90	LM395K	6.90	MC4044P	4.90	ULN2209	2.45
CA3035	5.20	CD4031	4.70	CD40192	2.90	LM555CN	1.20	OM802	3.20	ULN2111	2.10
CA3039	2.10	CD4035	2.35	CD40194	2.90	LM555H	1.95	SAJ110	2.50	74C00	.55
CA3046	LM3046	CD4040	2.50	CD40195	2.90	LM556N	2.95	SAK140	2.50	74C02	.80
CA3053	1.70	CD4041	2.50	DM8097	1.90	LM562B	10.90	SD305DE	1.30	74C04	.55
CA3059	8.40	CD4042	1.95	HEF see	"CD"	LM565N	3.50	SD306DE	1.50	74C10	.65
CA3060	8.40	CD4043	2.25	LH0070	6.20	LM566CN	2.50	SL415A	2.70	74C14	2.80
CA3079	4.40	CD4044	2.25	LM114H	4.90	LM567CN	3.50	SD425A	1.80	74C20	.75
CA3080	2.10	CD4045	3.20	LM301AN	.95	LM709N	.95	SL437D	3.60	74C85	3.90
CA3081	2.70	CD4046	3.20	LM301CN	.95	LM710CN	1.25	SL440	1.90	74C86	2.00
CA3082	2.70	CD4047	1.95	LM304H	3.80	LM710CH		SL442	2.90	74C90	2.50
CA3083	2.90	CD4049	.90	LM305AH	3.80	LM723H	1.70	SL447	4.90	74C154	5.70
CA3086	LM3086	CD4050	.90	LM307N	1.60	LM723N	1.25	SL449	1.60	74C160	3.60
CA3089E	2.90	CD4051	2.25	LM308V	2.20	LM725N	5.90	SL610C	7.25	74C162	4.50
CA30900	6.90	CD4052	2.25	LM309K	2.60	LM733CH	2.70	SL612C	7.25	74C174	2.50
CA3091	18.00	CD4053	2.25	LM310N	3.90	LM733N	2.50	SL613C	12.50	74C192	2.80
CA3120E	4.50	CD4066	1.45	LM311A	3.60	LM741CH	1.20	SL620C	9.50	74C901	1.95
CA3127E	4.50	CD4068	.55	LM311H	3.60	LM741CN	.75	SL621C	9.50	74C925	16.70
CA3128E	9.90	CD4069	.60	LM312H	4.90	LM747CH	2.70	SL623C	17.40	80C95	2.20
CA3130T	2.25	CD4070	.55	LM317K	6.90	LM747CN	2.50	SL622C	26.90	**MISC**	
CA3140T	2.25	CD4071	.55	LM318N	5.90	LM748CN	1.20	SL624C	8.80	AL5352	1.50
CA3600	3.30	CD4072	.55	LM319H	7.25	LM1303N	2.60	SL630C	6.90	GL4484	1.80
CD4000	.55	CD4075	.55	LM319N	5.90	LM1310N	3.50	SL640C	10.60	GL5253	.90
CD4001	.55	CD4076	1.25	LM320K	6.90	LM1458N	2.50	SL641C	10.60	OL31	.90
CD4002	.55	CD4078	.55	LM320T	4.50	LM1488N	6.90	SL645C	12.60	RL4484	.39
CD4006	2.30	CD4081	.55	LM322N	4.50	LM1489N	5.75	SL901B	3.90	RL5023	.35
CD4007	.55	CD4082	.55	LM323K	7.90	LM1496N	1.90	SL917B	6.50	FND357	3.50
CD4008	2.35	CD4085	1.65	LM324N	4.50	LM1808N	3.90	SL1310	1.60	FND500	3.50
CD4009	1.50	CD4086	1.65	LM325N	4.50	LM3028	CA3028	SL3046	1.20	9001	1.80
CD4010	1.50	CD4093	1.80	LM326H	4.50	LM3046	3.60	SP8505	8.60	9368	3.85
CD4011	.55	CD4502	2.70	LM339N	3.70	LM3086	3.75	SP8515	12.90	9601	2.90
CD4012	.55	CD4503	1.40	LM340K	4.95	LM3900	1.75	TAA300	2.90	NSN71	2.90
CD4013	.90	CD4510	3.20	LM340T	2.70	LM3905	3.90	TBA570	2.90	NSN74	2.90
CD4014	2.40	CD4511	3.30	LM349N	4.50	LM3909	1.50	TBA700	4.90	TIL306A	
CD4015	2.40	CD4514	6.50	LM358N	3.20	MC1035P	2.90	TBA810A	4.90	11C90	18.50
CD4016	.90	CD4515	6.50	LM370H	4.95	MC1312P	4.80	TB1750A	3.90	95H90	14.50
CD4017	2.25	CD4516	3.20	LM371N	3.90	MC1314P	6.90	TCA220	2.25	2102-2	3.75
CD4018	2.25	CD4518	2.85	LM372H	7.50	MC1315P	10.75	TCA290A	4.90	2513N	17.50
CD4019	2.25	CD4519	1.35	LM372N	4.50	MC1350P	1.95	TCA420A	4.90	S1883	
CD4020	2.50	CD4520	2.55	LM373N	4.70	MC1351P	3.60	TCA580	6.50	S50242	15.00
CD4021	2.25	CD4528	1.80	LM374N	4.90	MC1454G	5.40	TCA730	6.90	MA1002	13.50
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CD4023	.55	CD4555	1.80	LM377N	3.50	MC1468L	6.50	TDA1005	5.50	7824CP	
CD4024	1.75	CD4556	1.80	LM379	7.50	MC1488	LM1488	UAA170	3.25		
CD4025	.55	CD4720	12.60								

In some cases pin for pin substitutes will be supplied.

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7400	.48	7483	2.30	74S258	4.75	74LS174	2.70	BD238	1.80	2N3566	.95
7401	.48	7485	2.95	74S196	7.50	74LS175	2.70	BD437	2.80	2N3568	.95
7402	.48	7486	.85	82S23	6.95	74LS181	6.50	BD438	2.80	2N3569	.50
7403	.48	7489	4.50	8281A	3.90	74LS191	4.50	BF173	1.25	2N3638	.55
7404	.48	7490	.90	82S90	7.50	74LS192	4.50	BF180	1.20	2N3638A	.60
7405	.48	7491	1.90	74LS00	.55	74LS193	4.50	BF194	.85	2N3642	.55
7406	1.09	7492	1.20	74LS01	.55	74LS194	2.60	BF200	1.30	2N3643	.55
7407	1.09	7493	1.20	74LS02	.55	74LS195	2.60	BFY50	1.20	2N3694	.65
7408	1.09	7494	2.20	74LS03	.55	74LS196	2.60	BFY51	1.50	2N3731	5.95
7409	.48	7495	1.65	74LS04	.65	74LS221	2.50	BPX25	4.90	2N3819	1.35
7410	.48	7496	2.15	74LS08	.55	74LS253	2.75	BSX19	.75	2N3866	2.75
7411	.54	74100	3.65	74LS09	.55	**SEMICONDS**		BU126	3.85	2N4037	1.25
7413	1.15	74107	.95	74LS10	.60	AC125	1.80	MFE131	1.95	2N4249	.65
7414	2.70	74121	1.20	74LS11	.55	AC126	1.80	MJ802	8.90	2N4250	.65
7416	1.00	74122	1.20	74LS13	1.20	AC127	1.80	MJ2955	2.60	2N4355	.65
7417	1.15	74123	1.40	74LS14	2.95	AC128	1.80	MJ4502	8.90	2N4356	.65
7420	.48	74132	1.90	74LS20	.55	AC132	1.50	MPF102	.65	2N4360	.95
7422	1.95	74141	2.75	74LS21	.55	AC187	1.50	MPF103	.85	2N5245	.75
7425	.95	74145	2.95	74LS22		AC188	1.50	MPF104	1.10	2N5457	MPF103
7426	.70	74150	3.25	74LS27	.60	AD149	2.60	MPF105	.65	2N5458	MPF104
7427	.66	74151	2.20	74LS28	.60	AD161/62	4.50	MPF106	1.15	2N5459	MPF105
7430	.48	74153	1.95	74LS30	.55	AS322	.18	MPF121	1.60	2N5485	MPF106
7432	.66	74154	3.20	74LS32	.70	AT1138	2N301	MPF603	6.90	2N5590	MPF603
7437	.90	74157	2.20	74LS37	.70	ASY17	2.65	TIP31C	1.20	2N5591	11.30
7438	.90	74160	2.75	74LS38	.70	BC107	.35	TIP32C	1.30	2N6027	1.35
7440	.48	74164	2.90	74LS40	.65	BC108	.35	TIP120	3.20	2N6084	21.00
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7442	2.60	74174	2.90	74LS73	.75	BC177	.40	TIP141	4.70	OA47	.60
7445	2.60	74180	2.90	74LS74	.90	BC178	.40	TIP2955	1.70	OA90	.35
7446	2.60	74181	5.95	74LS75	1.20	BC179	.40	TIP3055	1.70	OA91	.35
7447	2.60	74185	4.90	74LS78	.75	BC182	.40	TT800	2N4037	5082-2800	3.20
7448	2.60	74190	3.20	74LS86	.95	BC212	.50	TT801	1.20	40440	2N3731
7450	.48	74177	2.90	74LS90	1.95	BC327	.55	2N301	2N2869	40637A	2.85
7451	.48	74191	2.90	74LS92	1.95	BC337	.55	2N706A	1.20	40673	1.95
7453	.48	74192	2.75	74LS93	1.95	BC547	.55	2N918	1.60	40822	2.90
7454	.48	74193	2.75	74LS95	2.60	BC548	.55	2N2222A	1.20	40841	1.90
7460	.48	74194	2.50	74LS109	.85	BC549C	.55	2N2646	2.50	BZX61	.75
7470	.85	74195	1.90	74LS113	.85	BC559	.55	2N2869	2.70	BZX79	.42
7472	.75	74196	2.90	74LS114	.85	BC639	1.20	2N2904A	1.50	BZX70	1.50
7473	.80	74S00	1.50	74LS151	2.60	BC640	1.20	2N2905	1.20	BZY93	2.60
7474	.95	74S10	1.75	74LS153		BD131	1.20	2N3053	1.20	BZY91	12.50
7475	1.35	74S20	1.75	74LS157	2.40	BD132	1.60	2N3054	1.70	PA40	5.85
7476	.90	74S74	3.50	74LS163	3.95	BD139	1.20	2N3055	1.35	PB60	6.50
7480	1.60	74S112	3.20	74LS163	3.95	BD140	1.20	2N3564	.65	MEL12	1.40
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VK6	**VK6RTV, Perth**	**52.300**
	VK6RTU, Kalgoorlie	**52.350**
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	VK6RTW, Albany	**144.500**
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ZL3	**ZL3VHF, Christchurch**	**145.300**
ZL4	**ZL4VHF, Dunedin**	**145.400**

SIX METRES

This band died its usual natural death following mainly the closing of the Ross Hull Contest. There have been odd openings from time to time, the last recorded here at time of writing being to John VK2BHO on 18/2. Amongst other things the band will be remembered this time for a Ross Hull Contest with changed rules which have produced quite a few comments on the bands, both for and against. OK. But if you have some constructive thoughts on the future rules of the contest put them down on paper and send them to the Contest Manager, the more the merrier, and do it now, to give him time to think about the pros and cons before rules are published for the next contest. I do not like some aspects of the rules and others I agree with, but I will be having my say by letter anyway. It is very difficult, however, to provide a set of rules for a VHF Contest which will suit and be fair to all would-be operators because of our very large country, and the way operators are situated geographically. But I do believe there is something to be found between the present rules and those previously which will be a compromise and suit a majority. But do write, do not just grouch on the air.

It will be April when you read these notes, so do not forget that's in the equinoxial priod when six metres could provide some very interesting long haul DX contacts, and from outside Australia too. I suggest you look north and north-east during the late mornings and from mid-afternoons onwards, anything could happen.

TWO METRES

This still continues to be the band bringing the surprises. It has now been shown how regularly it is possible to work through to Albany in VK6, especially from VK5, but often from VK3 and, as you will read later, from VK7. "QRM" reports Peter VK7PD parked in Ulverstone hearing the VK4 Brisbane repeater noise free, and Kevin VK7ZAH was heard in Brisbane exchanging signal reports with VK3YJI.

To show 2 metres does sometimes go inland I note Robert VK3AUR up in the Grampians worked Wally VK6WG after a lot of trying. A good effort, Robert, I know only too well what it is like to be in behind hills looking west.

During the John Moyle Memorial Field Day Contest, Col VK5RO was called by VK7ZAO/7 and heard VK7ZAL/7, but no contacts resulted.

Norman VK7NR writes an interesting letter outlining some special events that occurred in Tasmania, and his letter is worth reading.

"On the morning of 9/2/77 motoring to work with the mobile on, running 1½ watts to a hi-gain (3ZCG type) antenna on the roof, I thought I heard a VK6 — said to myself must be a tourist, listened again, time being 2140Z, and sure enough the Geelong repeater (Ch. 4) pops up about S8 with VK6ZDT calling CQ — I still thought he was mobile in VK7.

"At 2155Z Dennis VK6ZDT again called CQ and gave his QTH as Wagin, WA. I called him back, and he returned with a gasp and gave me R5 S5. I switched power to 15 watts out, it made no difference, so the loss was on Geelong to Wagin path. Spent a good 5 minutes chatting when the VK3's caught on and under the QRM he went. But I heard him on and off until 2300Z. Wagin is 200 km south of Perth and 150 km east of Bunbury. VK6ZDT has no SSB equipment and was using a 7 element yagi. I was 100 feet a.s.l. and the Geelong repeater was audible in most of Launceston.

"I got on to John VK7JV who lives high on a hillside; he tried to listen and work him on reverse repeater, some noise heard but not identified. Weather conditions at the time consisted of a great sausage shaped high pressure system stretching from west of WA almost across to ZL with a depth of not more than 350 miles at its widest point, with the centre just east of Tasmania. Also another very high pressure system was following from the west. The weather itself locally seemed to be like a very high sea mist stretching to the west as far as I could see.

"I work for STC Ltd. and I had nothing but complaints from mobile radio users about extended propagation during the day (9/2). But here's the juicy bit! We had UHF mobiles in North-West Tasmania working other commercial UHF mobiles mobile to mobile in VK2 and VK4 between Armidale and just north of Brisbane! What a day, and I almost missed it all.

"I don't think any records were broken but at least it might encourage more beams to be pointed East or West as the case may be, to help break the scourge of the continent, The Nullabor." Thanks, Norman, your letter was certainly most welcome, and if it does nothing else, could help to indicate the feasibility of working VK7 to Albany direct in the future, either with SSB or FM, then what, Albany to ZL?

What is interesting, however, is the UHF operation from VK7 to northern VK2 and to VK4. This indicates the existence at times of north-south paths and as the mobiles making contacts were commercial units they would probably have been in the frequency range of 450 to 480 MHz which is getting fairly high for whip to whip operation, actually rather a staggering achievement, and one which will be the envy of many amateurs. There seems no end to the surprises to be found at times on the VHF/UHF expanding world!

Another letter to pass on to readers comes from Allan VK4ZRF who is Secretary of the Brisbane VHF Group who feels that the report which came to me of 60 active locals (Brisbane) on 2 metres (see Jan. AR) was slightly misleading. He advises "There would be approximately 10 locals who are regularly active on 2 metres, possibly 60 have the capability, but most of these are FT221 owners who leave their rigs parked on some FM channel. As for the 4CX250B's, well, there are quite a few who have tubes and sockets, some with both. There are even a couple who are doing some construction work on them, but there is one operator at time of writing and that's mine. Mal VK4ZEL has one on 6 and 2 metres, but a few months ago gave up amateur radio for fishing!

"Rod VK4ZRQ, Steve VK4ZSH and myself (VK4ZRF) (locally known as the mad trio) zapped down to Point Lookout, near Round Mountain, 50 miles east of Armidale, approximately 5200 a.s.l. for the VK2 mid-summer VHF-UHF field day contest. We were hoping for contacts with Brisbane, country areas of NSW within a 300 mile radius, and stacks of contacts with Sydney and Newcastle. We had 100 watts of SSB on 2m, 10W on 6m, 100W on FM, etc. On 6 metres we worked VK2BMX and VK2ZMO Newcastle and VK2ADT Pt. Macquarie. On 2 metres worked 8 Brisbane stations several times, plus VK4QE Gold Coast, several VK2's from Lismore and surrounding areas plus VK2APF/2 in the Blue Mountains, but to our dismay we did not work one station from Sydney, although their beacons were audible all the time on the Saturday and Sunday of the contest. Disappointing because we had sent word ahead of our expedition, but perhaps the 42°C heat was too much for them there. Strange!

"Bill VK2ZVC in Pt. Macquarie was worked by the usual Brisbane gang over the distance of 270 miles for about 3 hours

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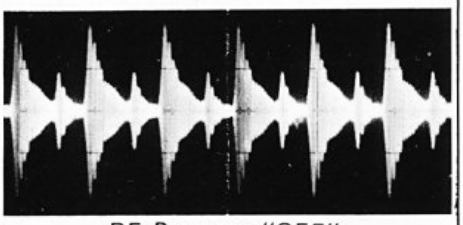

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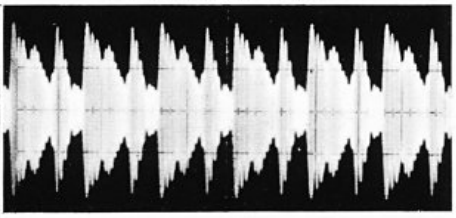

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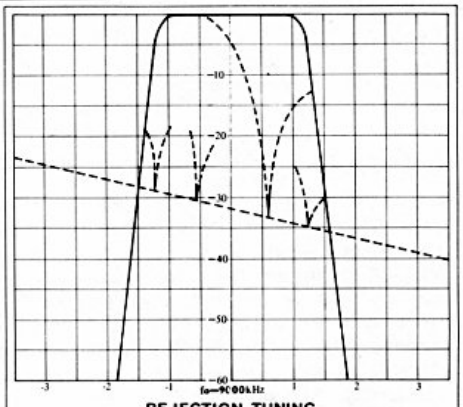

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Harmonic & Other Spurious Response: Image Rejection better than 50 dB. Internal Spurious Signal below 1 μ V equivalent to antenna input.
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on 31/12. Signals peaked to S9. Steve VK4ZSH using his IC202 and a 3 el. foxhunt yagi from Mt. Coatha also worked into Pt. Macquarie with signals S9 both ways." Thanks for the letter, Allan, you will always be remembered at this QTH for our 15 milliwatt contact on 6 metres earlier in the season!

While still dealing with letters, I have one from John VK5KG, which comes in response to my request for information on ATV activity in Australia.

"In Adelaide interest in ATV should soon get a long overdue shot-in-the-arm now that we have been granted a licence for an ATV repeater utilising 70cm uplink with 50cm (remember the old 576 MHz band) downlink. This will mean that any amateur with a TV set with a UHF tuner (and most colour sets have them) will be able to receive ATV with the aid of a small outdoor antenna. 50cm comes out at about Channel 34½!

"Active Adelaide ATV operators include Mait VK5AO who transmits on 70cm AND m, Howard VK5ZBE, Ray VK5ZEF, Pat VK5ZFX, Graham VK5ZOF and myself, John VK5KG. Rarely seen are Bill VK5HD and George VK5GG, and Rick VK5ZFQ takes an interest in our activities by helping out on occasions.

"All the above, and any other Adelaide amateur who builds an ATV transmitter on 70cm will be able to use the new repeater which will be situated at O'Halloran Hill, south of Adelaide. We hope to control the repeater by the use of a microprocessor which should make it the first of its kind in more ways than one! Any person interested in this project or ATV in general is invited to write to me, John Ingham VK5KG, 37 Second Avenue, Sefton Park, 5083, or break into the fledgling ATV net each Friday at 0900Z on 7085 kHz (or 3585 kHz depending on conditions), or on 53.500 MHz AM in Adelaide any time activity is heard."

Thank you, John, for writing, perhaps this will be the forerunner of some similar information from other centres of activity in VK. The opportunity is yours, gentlemen, if you will only write to me.

1296 MHz

Since the report of the record breaking contact last month between Reg VK5QR and Wally VK6WG on 1296 MHz, they have been at it again! On 15/2 Roger VK5NY heard Wally on 1296, and Wally was worked by Reg with good signals both ways. Reg reports the band being open for about 6 hours, during which time about 8 contacts were made! Les VK3ZBJ and Ron VK3AKC were also trying to make it to Wally without success.

All this was still not enough for these record breaking operators, as they fired up again on the night of 24/2 and worked both ways again at 5 x 8, and did the same thing again the next morning! So it seems to be a continuing event, for which they are to be congratulated again, especially considering the very low power they are using. Next plans are to go up to 2304 MHz and try it there, and considering the strength of signals on 1296 (and I have personally heard them on tape), there seems little doubt contact will eventually be made on that band.

MOONBOUNCE REPORT

Lyle VK2ALU reports in "The Propogator" of their recent activities on 432 MHz EME as follows:

12/12/76	JA1ATL — first contact, O signal strength reports each way. JA1VDV — O reports each way. F2TU — first contact, M reports each way.
8/1/77	K3PGP — first contact, M reports each way. WB5LUA — faded out after a few minutes, T report sent.
23/1/77	FY7AS — French Guiana — first contact, M reports each way. First Australia - South America contact on 70cm. This contact was the result of a CQ during the known common window rather than a scheduled test.

FY7AS uses circular polarisation. He was of consistent signal strength though only 1 to 3 dB over noise for most of the contact. He is located at the Guiana Space Centre.

It appears the period of supremacy of bipolar transistors for very low noise 70cm preamplifiers is over. The MT4575 bipolars used by VK2AMW and others give a measured noise figure of 1.2 dB on 432 MHz.

Now JA1VDV has come up with a design for a 432 MHz pre-amp having a gain of 15 dB and the incredibly low noise figure of less than 0.8 dB, according to his report in the 432 EME News for January 1977. The transistor used is a V244 GASFET which costs about $200 in USA and Japan.

The price may seem very high for such a device, but if they were in use at VK2AMW in place of our present front end transistors then our receiving system would be upgraded to the same extent as would require an increase of dish diameter from our present 30 feet to approximately 40 feet. Such would certainly cost more.

GENERAL NEWS

I note that so far there has been no response to my feeler put out recently regarding the formation of an 80 or 40 metre VHF/UHF net. If you intend writing about it, why not do so soon, at least some idea of likely interest could be ascertained.

The South East Radio Group Annual Convention is to be held again in Mt. Gambier over the June holiday weekend, 11th and 12th. Whilst sometimes there is mention of not going on with these conventions, the very good response with attendance by interested amateurs seems to quell all fears. I for one certainly look forward to them.

Lance VK4ZAZ mentions a worthwhile station to look out for is the new Brisbane FM station on 105.7 MHz. It could certainly be a very good pointer to a rising MUF and 144 MHz possibilities for that path. The fact that similar stations exist in Sydney and Melbourne are also worth keeping in mind.

That's about all for now. Thought for the month: "Inflation marches on, making it possible for people in all walks of life to live in more expensive neighbourhoods without even moving."

The Voice in the Hills. ■

CONTESTS

Kevin Phillips, VK3AUQ
Box 67, East Melbourne, 3002

CONTEST CALENDAR

April	
2/3	Common Market DX contest
2/3	Polish "SP" CW contest
2/4	ARCI QRP contest
12/13	DX YL to W/VE YL CW
16/17	Bermuda contest
16/17	Polish "SP" Phone contest
16/17	ARRL CD CW party
16/17	Florida QSO party
23/24	ARRL CD Phone party
23/24	PACC DX contest
23/24	Swiss "H-22" contest
26/27	DX YL to W/VE YL Phone
May	
1/2	Connecticut QSO party
7/8	Vermont QSO party
7/9	Georgia QSO party
14/15	Massachusetts QSO party
14/15	Kansas QSO party
14/16	Michigan QSO party
15	World Tele- Comm. Phone
21/22	YL Int'l SSBers, Inc. QSO party
21/22	New York State QSO party
22	World Tele- Comm. CW

YL Int'l SSBers, Inc. QSO party 1977.

Starts 0001 GMT May 21 and finishes 1359 GMT May 22, 1977. One 6 hour rest period in each 24 hours must be taken.

This year, DX stations are given greater encouragement to participate, by the rule which allocates 500 bonus points per 5 DX stations worked outside one's own continent.

Modes: CW and Phone, all bands.

Categories: 1. DX/WK Teams. A DX/WK team consists of one DX member and one Stateside member whose scores will be combined.

2. YL/OM Teams.

3. Single Operators.

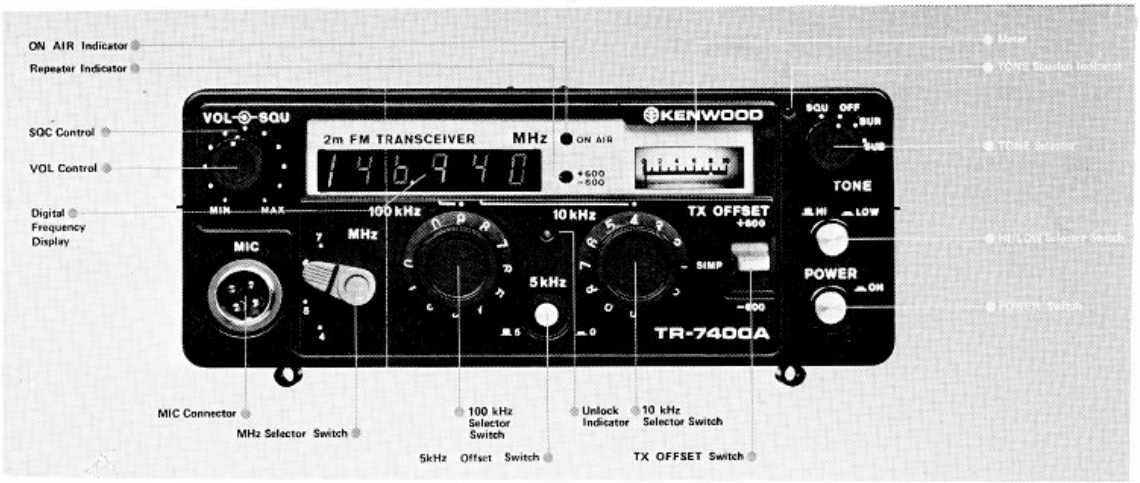
A plaque will be awarded to the highest scoring team in each category, and to the highest scoring single operator. Certificates will be awarded to highest scoring members in each state and country.

Suggested operating segments: 30 kHz around the following central frequencies: CW: 3565, 7070, 14070, 21070, 28070. Phone: 3925, 7290, 14333, 21373, 28673.

Note: Stateside stations will listen for VK stations around 3690 and 7090 on phone.

QSO Points: Phone: 2 points for each member contacted on same continent. 4 points for each member contacted on a different continent. 1 point for each non-member contacted regardless of location.

ANNOUNCING NEW 2 METRE FM TRANSCEIVER FROM KENWOOD



TR7400A ☆ FULL 4 MHz COVERAGE ☆ 25 WATTS OUTPUT HIGH, 5 to 15 WATTS LOW OFFSET FOR REPEATER ±600 kHz ☆ FULLY SYNTHESISED ☆ 5 DIGITAL READOUTS ☆ LIMITED NUMBER EX STOCK

KENWOOD TS820HF TRANSCEIVER
The pacesetter, provides superior performance, versatility and features found in no other Transceiver.

KENWOOD TS520HF TRANSCEIVER
Offers top performance, dependability and versatility at a realistic price.

KENWOOD MATCHING ACCESSORIES

KENWOOD TS700A VHF TRANSCEIVER
2 metre SSB/FM/AM/CW, offset for repeater operation. Tuneable VFO. All solid state. Full 4 MHz coverage, AC/DC. 10 Watts. Ideal for local — DX — or Oscar.

KENWOOD TS600 VHF TRANSCEIVER
Matching in size and performance to the TS700A, coverage 50 to 54 MHz. SSB/FM/AM/CW. INDENT ONLY.

We can also supply from the YAESU MUSEN range, the FT301D, FT301S, FT221R, FRG7 communication receiver.

FOR AMATEUR EQUIPMENT BASED ON COMPETITIVE PRICES, PHONE OR WRITE:

AMATEUR ELECTRONIC IMPORTS

APPOINTED KENWOOD DEALER

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TELEPHONE (02) 547 1467

INTERSELL ELECTRONICS PTY. LTD.

TRANSCEIVERS

SWAN 700CX — 700 W PEP Input. Standard Model 8 Pole filter and also 700CX SS16B with 16 Pole filter	P.O.A.
SWAN 300B — 300 W PEP input. USB and LSB Xtal calbr. with Standard and 16 Pole filter. Complete with integral PSU and Speaker	$489.00
SWAN SS200A — All Solid State 300 W PEP input incl. VOX, Noise Blanker, SW Sidetone, Xtal calibr. and complete VSWR protection with special 16 Pole filter	$750.00

POWER SUPPLIES

230XC — Complete with Cabinet and Speaker for 700CX. 230X PSU only. Both for 240 V AC mains, complete with supply leads and plugs	P.O.A.
PS220 for SS200A	$169.00

WATTMETERS

WM1500 — 1.8 MHz to 52 MHz, 0 to 1500 W RMS in 4 ranges 5/50/500/1500 W. Large easily read meter with forward power switch and reflected power	$65.00
PEAK READING WATTMETER — reads PEP and RMS power up to 2000 watts in 3 ranges incl. reflected power	$80.00
Secondhand FT101 with factory fitted 160MX complete with VFO fan and CW filter. Immaculate condition complete with manuals	$500.00

MICROPHONES

444 SHURE desk mikes adjustable height, locking bar with VOX switch facility	$45.00
404 SHURE hand mikes — both mikes now in stock again. Proven popularity due to specific tailoring for SSB. Both models complete with lead and plug	$35.00

ANTENNAS

Two Element TB2HA	$160.00
Three Element TB2HA	$225.00
Four Element TB2HA	$290.00
Solidly made antennas with all elements active on 20/15/10 MX.	

MOBILE ANTENNAS

SLIMLINE 500 W PEP Mobile Antennas with base section, coil and adjustable top whip of stainless steel.

15MX	$35.00
20MX	$40.00
40MX	$45.00
HD Spring	$16.00
HD Mount	$16.00

VALVES

Most Valves for Swan equipment in stock	$10.00 ea.
8950 6HF5, 6LQ6/6MJ6. Available in matched pairs.	
FC76 Digital Freq. Meter Read TX Freq.	$175.00

All prices quoted are subject to changes without notice, but are inclusive of Sales Tax. Freight and Insurance extra.

SOLE AUSTRALIAN DISTRIBUTORS FOR SWAN AMATEUR AND COMMERCIAL RADIO EQUIPMENT:

VK2AHK **3 MIDSON ROAD, OAKVILLE, N.S.W. 2765 — PHONE: (045) 73 6215**

MAKE IT ON 70 cm FROM YOUR MOBILE OR HOME STATION, 2m RIG

NEW RELEASE — TRANSVERTER MODEL MMT432/144

UTILIZING an IF of 144 MHz ★ 10 WATTS DRIVE OR ½ WATT ★ VOX OPERATED

This 432 solid state linear transverter is intended for use with a 144 MHz transceiver to produce a high reliability transceive capability. A 10 watt load and RF sensing network eliminates the need for any ancillary circuitry. A single coaxial connection is all that is required between the transverter and the associated 144 MHz transceiver.

A wide range of applications is offered by this MMT432/114 transverter, which by virtue of its linear mode of operation will enable 144 MHz SSB, FM, AM or CW equipment to be used at 432 MHz.

Simply connect direct to your 2 metre rig, 12 volt supply, fit 70 cm antenna for instant SSB, FM, AM, CW operation.

FEATURES: High quality double-sided glass fibre printed board ★ Highly stable zener controlled oscillator stages ★ PIN diode aerial changeover relay with less than 0.2 dB through loss ★ Extremely low noise receive converter, typical 3 dB ★ Separate receive converter output gives independent receiver facility ★ Built in Automatic RF VOX with override facility ★ Built in 10 watt 144 MHz termination, selectable attenuator for ½ watt ★ Use of the latest state of the art Power Amplifier transistors provide reliable 10 watts continuous output. Limited supply only availavle ex stock, further units currently on order for expected early delivery.

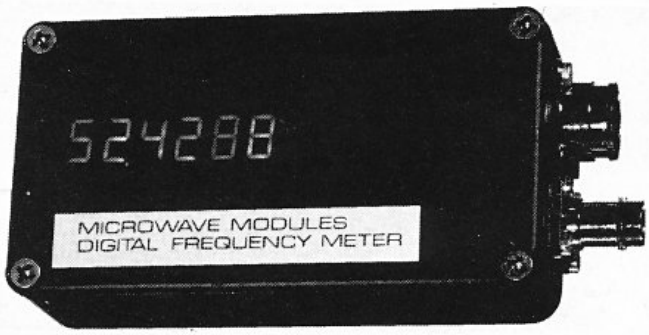
Model MMT432/144 — Price $260

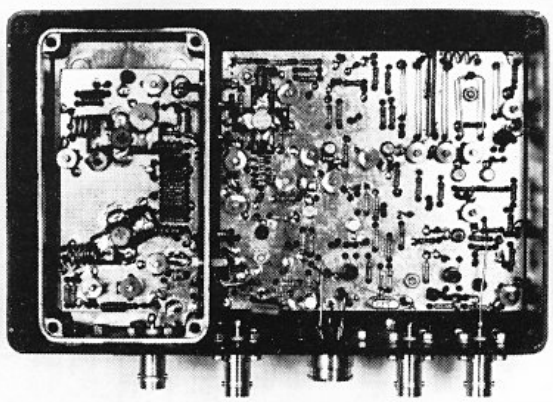
TRANSVERTER MODEL MMT432/28

FEATURING COMBINATION OF A LOW-NOISE RECEIVE CONVERTER AND A LOW-DISTORTION TRANSMIT CONVERTER PRODUCNG A SPURIOUS-FREE LINEAR SSB SIGNAL, PARTICULARLY WHERE HIGH STABILITY AND SENSITIVITY ARE OF IMPORTANCE.

Power Output 10 watts minimum ★ 28 MHz IF ★ Drive 1 mW to 500 mW ★ Aerial Changeover by PIN diode switch ★ Modern Microstrip Techniques ★ Power requirements 12 volt nominal at 150 mA 2.5 amp. peak ★ Case size 187 x 120 x 53 cm ★ Spare 432 input socket.

MODEL MMT432 — Price $215





MMT432 TRANSVERTER

New Release – 500 MHz COUNTER

This counter has two ranges which are selected by supplying + 12 volts to one of two pins on the DIN socket. Internal diode switching brings the input in the 0.45 - 50 MHz range to a wide-band amplifier which drives a high speed TTL divider in the main counter logic. On the 50 - 500 MHz range the diodes switch in a high speed ECL prescaler and the demical point is changed accordingly.

A low angle AT cut quartz crystal is used giving a typical temperature stability of 0.5 ppm per degree C. Provision is made for setting the crystal frequency, and the accuracy of reading is normally better than 200 Hz at 50 MHz, or 2 kHz at 500 MHz.

The counter has reverse polarity protection and operates satisfactorily from a nominal 12V DC supply. A suitable 5 pin DIN plug is supplied.

SPECIFICATION

Digit Height	10 mm
Display Width	45 mm
Case Size	111 x 60 x 27 mm
Frequency Ranges	0.45 - 50 MHz, 50 - 500 MHz
Sensitivity	Better than 50 mV RMS over 0.45 - 50 MHz. Better than 200 mV RMS over 50 - 500 MHz
Input Connector	50 ohm BNC
Input Impedance	200 ohm approximately
Power Connector	5 pin 270 deg. locking DIN socket (supplied with plug)
Power Requirements	11 - 15 volts DC at 300 mA approximately

Model MMD500P — 500 MHz Prescaler, $55.

Model MMD050/500—500 MHz Counter, $175. **Model MMD050—50 MHz Counter, $130.**

TRANSVERTER MODEL 144/28

This 144 MHz Solid State Linear Transverter is intended for use with 28 MHz transceiver to produce a highly reliable transceive capability for satellite or terrestrial communication ★ Power output 10W min. ★ 28 MHz drive ★ IF at 500 mW or 5 mW ★ Receiver gain and noise, typical 30 dB and 2.5 dB ★ Internal Antenna changeover ★ Case size 187 x 120 x 53 cm ★ Power requirements 11 to 13V at 300 mA to 2.2 amp. peak ★ Spare 144 MHz input socket.

Model MMT144/28 — Price $185

NEW READY-TO-OPERATE MODULES AVAILABLE IN THE SALES PROGRAM OF VHF COMMUNICATIONS

1296 MHz CONVERTER
Microstripline, Schottky diode mixer.
IF: 28-30 MHz or 144-146 MHz.
Noise figure: typ. 8.5 dB.
Overall gain 25 dB. **Price: $65.**

432 MHz CONVERTER
2 silicon pre-amplifier stages. MOSFET mixer. All UHF circuits in microstrip technology.
Noise figure: typ. 3.8 dB.
Overall gain: typ. 30 dB.
IF: 28-30 MHz or 144-146 MHz 9-15 V 30 mA. **Price: $51.**

144 MHz MOSFET CONVERTER
Noise figure: typ. 2.8 dB.
Overall gain: typ. 30 dB.
IF: 28-30 MHz, 9-15 V 20 mA.

Price: $45.

VARACTOR TRIPLER 432/1296 MHz
Max. input at 432 MHz: 24 W (FM, CW) - 12 W (AM).
Max. output at 1296 MHz: 14 W.

Price: $74.

Pack and Post $1

All modules are enclosed in black cast-aluminium cases of 13 cm by 6 cm by 3 cm and are fitted with BNC connectors. Input and output impedance is 50 ohms. Completely professional technology, manufacture, and alignment. Extremely suitable for operation via OSCAR 7 or for normal VHF/UHF communications.

ONWARDS forwarding. It is recommended that items forwarded by Mail are registered. Post Office charge is $2, this also includes insurance. If required, goods will be forwarded by Ansett air freight or road transport collect.

Australian Distributors for Microwave Modules Limited:

AMATEUR ELECTRONIC IMPORTS

P.O. BOX 160, KOGARAH 2217, N.S.W. **PHONE: (02) 547 1467**

CW: Double the above points.

Stations may be contacted on Phone and CW on each band for QSO points.

Multipliers: Only member stations can count as multipliers.

States: 1 per State worked.

Countries: Same continent stations may be worked once only for multiplier credit (1).

Different continent stations may be worked on both Phone and CW on each band for multiplier credit (1 each time).

Teams: Each complete YL/OM or DX/WK team contacted (1 per team).

Bonus points: Add 500 points to your final score for each set of 5 DX stations contacted outside your own continent. For bonus points purposes, each DX station may be used once only, regardless of band or mode.

Logs: Must show date, GMT, RS(T), SSB-er number, partner's call, mode of operation, band, and period of rest time. Summary sheets must be compiled and enclosed. All logs must be postmarked on or before June 22, 1977, and be received on or before July 10, 1977. Send logs to Larry Miller W6ANB, 224 15th Street, Santa Monica, California, 90402.

Any member desiring to enter the DX/WK Team category should immediately send request to K6JG (ex WA6MWG), Pete Billon, 4040 Via Opata, Palos Verdes Estates, California, 90274. For records purposes, requests should be made in writing. In the week preceding the QSO party, May 14-21, members wishing a partner may request one through the system controls on SSB-ers' daily systems. No team assignments will be made after the party begins.

For this QSO party, the Call Book criterion will be used to determine in which continent a particular country should be identified. For further information, contact Ivor Stafford VK3XB.

PACC DX CONTEST

Starts 1200 GMT April 23, finishes 1800 GMT April 24. All bands 1.8 to 28 MHz, both Phone and CW may be used. The same stations may be worked once only per band regardless of mode. Send RS(T) plus a QSO number starting at 001. PA/PI/PE stations will include 2 letters indicating their province.

There are 12 provinces: DR, FR, GD, GR, LB, NB, NH, OV, UT, YP, ZH, ZL, making a possible multiplier of 72. Each completed QSO counts 1 point. Multiplier is the number of provinces worked on each band. Final score is the sum of QSO points times the sum of provinces worked on each band.

There is a SWL section. Call of the Dutch station and serial number as well as the station being worked must be logged.

Certificates will be awarded to the top scoring single operator, multi-operator and SWL in each country and call areas in W/K, VE/VO, CE, JA, PY, UA9/UAO, VK, ZL, ZS.

Indicate the multiplier only the first time it is worked on each band. Include a summary sheet showing scoring and other pertinent details, your name and address in Block Letters, and a signed declaration that all rules and regulations have been observed. Mailing deadline is June 15 to: VERON Contest Manager, PA0DIN, Schoutstraat 15, Nymegen 6805, Netherlands. ■

AWARDS COLUMN

Brian Austin, VK5CA
P.O. Box 7A, Craters SA, 5152

ROENNE CITY JUBILEE AWARD
(Denmark)
To celebrate the 650 years anniversary of Ronne city.

Frequencies: All bands can be used.
Mode: FM, AM, SSB, CW, SSTV, RTTY.
Period: Only contacts made in the year 1977 count.
Points needed: LA-SM-OZ-OH need 5 points, other Europeans 3 points, outside Europe 2 points.
Category: The award can be obtained in one mode or in several modes.
QSL cards: It is not necessary to forward any QSL cards. Send a list of the amateurs contacted with information of date, time and QRG. This list has to be signed and controlled by two licensed amateurs in this country.
SWL: The award can be obtained by SWLs too. Same rules.
Fee: 10 IRC.
Repeaters: QSOs made via repeater will not count for this award.
Address: Send the application and 10 IRC to —

Award Manager, OZ4PM Poul Moerch,
Godthaabsvej 19
DK 3751 Oestermarie
Bornholm, Denmark.

TRONDHEIM 100 DX AWARD
(Norway)
Applicants must contact five amateur stations in the town of Trondheim, Norway, three of whom must be member of the Trondheim DX Club.

Send details of the contacts to:
The Trondheim DX Club,
P.O. Box 929,
7001 Trondheim, Norway.

Do not send QSL cards, but do enclose sufficient IRCs to cover cost of postage.

The first amateur to qualify in each country will, in addition to receiving the Award, be made an honorary member of the Club. ■

LARA

Ladies Amateur Radio Association

THE OM-OWNER'S MANUAL

It has occurred to members of LARA that newcomers to the field of radio might find the terminology (and slang) somewhat confusing. As a public service this month we present a glossary of commonly used terms:—

"OM" — What your Best-Beloved can turn into as soon as he is bitten by the radio bug. (You thought he was called a husband didn't you?)

"YL" or "XYL" (or other terms of endearment) = you.

"Shack" — You thought it was the garage until it became so full of rigs, aerials and other mess that the Rolls wouldn't fit.

"Tower" — Measures up to about 60 feet (vertically) — what he would really like to build in the back yard instead of the washing line — who needs a swimming pool anyway?

"Eyeball" — Face to face friendly meeting of amateurs — not a gruesome exotic foodstuff.

"Twisted Pair" — This interesting term does not refer to stockings on the washing line in a cyclone, nor does it refer to the OM and his best friend who spend hours out in the shack. It does in fact refer to the telephone.

"Faithful Hound" — Not the family pooch but the family car, festooned with directional aerials, rigs, etc., chasing around the countryside in pursuit of an EED (elusive electronic device) — referred to as "the fox" — or on LARA hunts as "the vixen".

Having put in a plug for LARA fox (vixen) hunts, I shall stop and leave readers in suspense as to the real meaning of the term "dipole". *N.B.* It has nothing to do with icy-poles on two sticks. ■

INTRUDER WATCH

Alf Chandler, VK3LC
1536 High Street, Glen Iris, 3146

A report submitted by the VK5 Co-ordinator to the "South Australian Wireless Institute Journal February 1977" in my opinion is a classic, and I am quoting from it verbatum here. Quote —

"After my appeal at a recent WIA meeting, I sat back and waited for results. I can now report that the results were exactly nil! I now without fear or favour accuse the average Divisional membership of being spineless, gutless or absolutely without regard to either their or their fellow amateurs' future. I make no apology for my statements, basing my remarks on the general attitude of the Divisional Membership. Oh, yes, we won the RD, when it comes to play contests or to yak yak after DX, VK5 is well to the fore, yet ask for 5 or 10 minutes of their valuable on the air time and it's remarkable how soon the QRM and QRN breaks down. I've said it before, I repeat it again, the general amateur community is too b——y lazy or to b——y ignorant to look after their own future. I get more support from NON-MEMBERS of the WIA whom I have contacted and I thank those chaps who DO think of their mates, ask them to join the WIA and their description of the Institute . . . and sometimes I don't blame them.

Do you hear the Asiatic BC stations creeping into your 80 metre band, Red China, Indonesian and even Australian CW commercials working openly on 40 metres, and South American, Russian and South African teleprinter stations going flat out in the amateur part of 20 metres? Of course it's no concern of yours, they are not in the part of the particular band you are using YET. I don't worry, I have worked my share of DX, rag chewed to my W, G, JA, etc., pals and experimented to my full desire, I have not many years before I become a "Silent Key" and I have other interests to fill in the waiting time, but you poor fish, how are *you* going to fill in the void in your precious time when there will be no Amateur Radio as such — THINK.

When you hear as I did a ship commercial tell a W amateur to QRT because he was QRMing his traffic, perhaps you will let a bit of light into that foggy vacuum you call a head. (Needless to say that commercial got reported quick smart **and** in red ink, hi!) Let's hope you fellows **see** the light before it's too late. INTRUDER WATCH does not ask, it DEMANDS reports to help protect our frequencies, why don't you remove the digit and help preserve that which ARRL, RSGB and WIA, to name only three, fought for. Like TOM the famous ARRL commentator who slammed rotten radio, I have kicked the dog and spat on the cat in pure disgust but I suppose you all will become HI-FI experts in the future, so why worry, I dont!" Unquote.

Think it over. ■

LETTERS TO THE EDITOR

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the publishers.

The Editor,
Dear Sir,
The letter in January 1977 "Amateur Radio" from Mr. Vale VK5NO with comments on apparent "lack of interest" in the VK/ZL/O DX Contest demands some reply. Any system of contest souring is debatable and with many years of contest operating experience and over 25 years as an administrator, this problem still concerns me. The concern is to use a system fairest to all and I still contend that the "BERU" fills this requirement better than others. Admittedly it DOES take a little more time to compute, but having re-scored hundreds of logs over the years, this is a matter of only a few more minutes. Further, this forces the entrant to take a more careful look at his claimed contacts. That certain problems arise in VK logs suggests either that up to date DXCC Countries Lists are not readily available and/or the scoring rules have not been adequately read.

The year to year degree of activity in VK and in ZL makes an interesting study as the following figures show:

Year	Organised by	ZL logs received	VK logs received	Total
1952	NZART	19	30	49
1953	WIA	15	25	44
1969	NZART	58	83	141*
1970	WIA	52	87	139†
1971	WIA	33	61	94
1972	NZART	41	68	109
1973	WIA	32	61	93
1974	NZART	45	64	109
1975	WIA	29	54	83
1976	NZART	66	75	141‡

* ZL Bi-Centennial.
† VK Bi-Centennial.
‡ NZART Jubilee.

Even the most fleeting glance will show that Mr. Vale's suggestion re "local" logs (this must refer to VK and ZL logs) is not really correct. Deeper study will show an interesting trend which apart from any possible differences in publicity might be due to the more liberal awards policy adopted by NZART in which recognition is given to placegetters in various categories. Admittedly this costs money but in the long run must have more than a little to commend it.

As some already know — I have suggested a change in scoring to a multiplier system — NOT however on a country basis but on a PREFIX basis which will give more appropriate incentive as well as utilising the ever increasing number of prefixes available. Even so, to most adequately recognise operating ability it is desirable that this be administered on a band to band basis.

No — not for one moment do I accept Mr. Vale's suggestion that the scoring system was at fault. I know Australians to be much more capable than he suggests — just as are New Zealanders! Finally I suggest that as with any other venture, PROMOTION is essential. NZART feels it has fulfilled its obligations to both Societies in this respect. Long may our association on this contest continue.

Jock White ZL2GX,
NZART Contest and Awards Manager. ■

The Editor,
Dear Sir,
I wish to point out that thanks to the efforts of our President Alan Austin we have a new patron, the Governor of Western Australia, Sir Wallace Kyle. His Excellency had a meeting with the President and our Secretary, Neil Penfold. He thought our constitution rather binding and restrictive. We are starting to change this and anticipate several changes in the constitution this year. One has already taken place which is the elimination of a qualified accountant as auditor. Any two members will now suffice.

John Kitchin,
Treasurer VK6 Division WIA. ■

QSP

ITU MEMBERSHIP

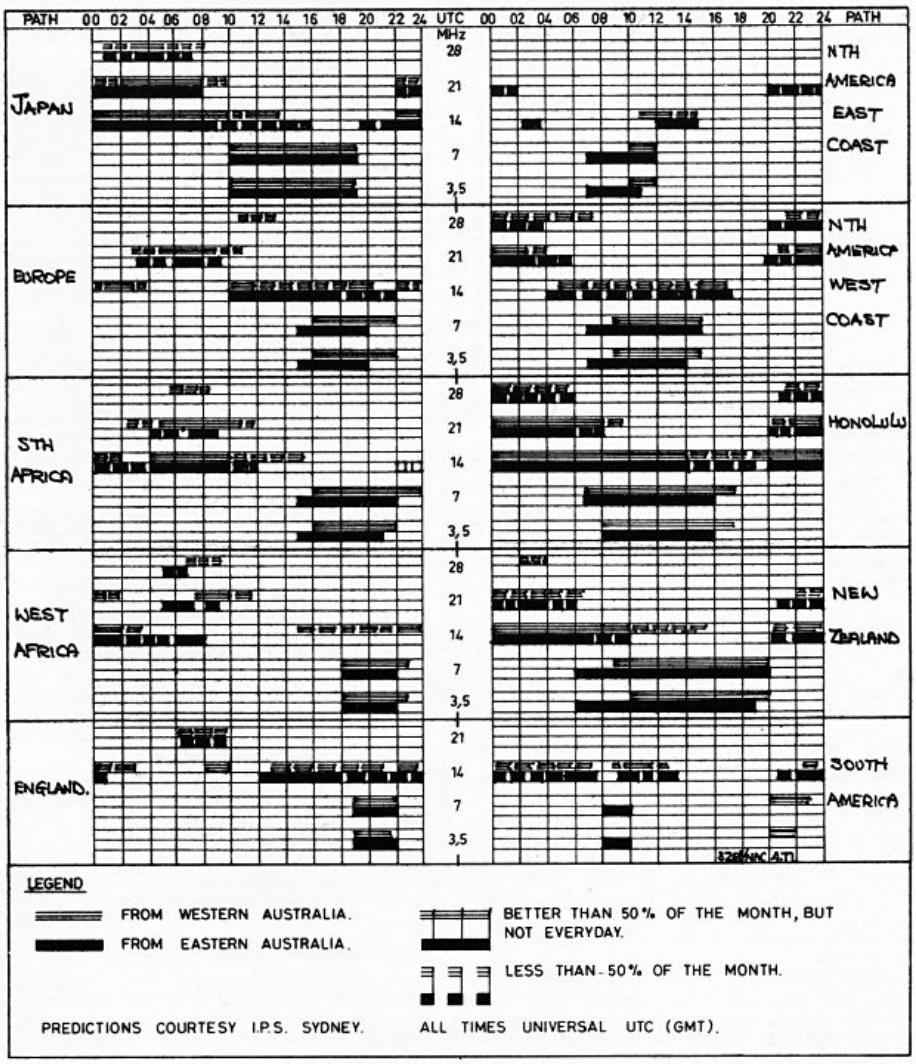
The Republic of Surinam has become the 149th member state of the ITU. It is understood that the ITU will soon announce that it has admitted to membership Sao Thome-Principe and Guinea-Bissau, both being newly independent African republics. Radio Communication, Nov. '76.

THE NOVICE LICENSEE

The fourth precept of the amateur code (see QSP AR June 1974 p.8) is that — "The amateur is friendly . . . slow and patient sending when requested . . . friendly advice and counsel to the beginner, kindly assistance and co-operation for the broadcast listener. These are marks of the amateur spirit". Remember the help you were given when you first started in amateur radio?

IONOSPHERIC PREDICTIONS

Len Poynter, VK3ZGP/NAC



AROUND THE TRADE

BWD TRANSFERS NSW OFFICE

Following upon the death in the Granville rail disaster of Mr. Hal Cranfield, NSW regional manager for BWD Electronics, it has been decided as from 21st February, to transfer all sales and service activities to BWD's authorised distributor, Amalgamated Wireless (A'asia) Ltd., 422 Lane Cove Road, North Ryde, NSW 2113. Phone 888 8111, Extn. 412 (Mr. Peter Crumpler), Telex 20623.

All enquiries directed to their distributor — or if preferred to BWD head office in Melbourne — will receive immediate attention. BWD's head office postal address is P.O. Box 325, Springvale, Vic., 3171. Phone (03) 561 2888, Telex 35115. ■

QSP

AMATEUR GRANTED PATENT

In the 1974 March to June issues of AR John Adcock VK3ACA published a series of articles describing his unusual experiments with audio processing. John has now been granted British patent 1454 158 for the improved speech compressor described in the above articles. Well done John!

Remember . . .

N.Q. CONVENTION

Details in March AR

HAMADS

- Eight lines free to all WIA members. $9 per 3 cm for non-members.
- Copy in typescript please or in block letters to P.O. Box 150, Toorak, Vic. 3142.
- Commercial advertising is excluded.
- Closing date: 1st day of the month preceding publication. Cancellations received after about 12th of the month cannot be processed.
- QTHR means the advertiser's name and address are correct in the current WIA Radio Amateurs Call Book.

FOR SALE

ICOM IC22 2m FM transceiver, xtals for 146 MHz operation, will consider offers, or exchange for ICOM IC502 or other 6m SSB equipment. Ph. (092) 92 2468 or write I. Connell VK6ZIC, C/- Box 67, Dampier, W.A., 6713.

Hygain TH6DXX Beam, new and unused, in original package, $250. VK3PG, QTHR.

Roband 5 in. oscilloscope, DC, 30 MHz, sweep ranges 0.1 usec/cm to 2 sec/cm, height 22cm, wid.h 43cm, depth 53.5cm, weight 14 kg. $150. VK2ZOF, 45 The Causeway, Maroubra, 2035. Ph. (02) 34 5571.

Yaesu-Musen FTDX100 transceiver, $400. Heathkit HW7 QRP transceiver, $100. VK3APO, QTHR. Ph. (03) 95 3329.

Kenwood TS520 transceiver 80-10m AC/DC with remote VFO and CW filter installed, mike and operating manual, excellent condition, 20 months old, had little use, $650. VK3BDY, QTHR. Ph. (03) 338 2105.

Teletype Model 15, $100. Kleinschmidt TT-76 (reperf, keyboard and TD) 230/115V, c/w gears to run on 60, 75 or 100 wpm, $200. Two Teletype MXD-8 three headed TD's (reconditioned), $20 each. TT-L/2 Terminal Unit 170/850 Hz shift, wide and narrow filters, scope indicator, AFSK generator, etc., $100. All gear in perfect working order. VK2KM, QTHR. Ph. (047) 31 5447 A.H.

Urgent Shack Cleanout (moving QTH): Swan 400 transceiver 80-10m with two matching VFO's and power supply, spare valves, $400. BC-342 RX 1.5-18 MHz, $30. BC-453 RX 190-550 kHz, $20. Tape Recorder, 2 speeds, $20. 60 feet four section wind up tower, $20. 40 feet two section wind up tower, c/w winch, guys and 2-el. 20m beam, $40. Audio generator, 3 Hz-300 kHz, sine and square wave, calibated meter and attenuator, $40. VK2KM, QTHR. Ph. (047) 31 5447 A.H.

Estate of late VK3ACE. Heathkit SB301 Rx, SB401 Tx, SB600, spkr., complete station, $375. SB200 linear, $275. SB101 xcvr with matching P/S and spkr., $275. Swan 350 xcvr with matching AC and DC PSU, $275. Johnson Matchbox ACU with SWR meter, $90. Johnson Ranger AM/CW Tx 160-10m, $20. TH6DXX tri-band beam, Ham M rotator, $180 the lot. 65 ft. tower free if required. Heathkit HF and VHF power meters, $40 each. Midland SWR meters, $15 each. B and W lowpass filter, $10. Ringo Ranger 2 metre antenna, $20. Numerous other bits and pieces. Contact VK3OM, QTHR. Ph. (03) 560 9215 for full list of gear available.

Two ex WW2 Navy TCS-13 type transceivers, complete with 12V DC gene-motor power supplies, cables, and remote cont. units. One unit original, the other slight Rx mod., both recently air tested OK. Units tune 1.5-3, 3-6, 6-12 MHz, VFO or xtl. locked (up to 4 xtals.). Tx power 10W AM or 25W CW, circuit diag's, etc., available, $50 each ONO. VK2BIP QTHR. Ph. (060) 76 9338.

FT200 transceiver as new, no mods, complete with HB AC power supply, Heathkit DC supply, $360 ONO. J. W. Nairn, Box 29, Churchill, 3842. Ph. (051) 22 1697.

Lafayette HA8008 80 through 6m amateur Rx, as new, $150. Also Deltahet mark 2 communications Rx. Kit cost $350, sell for $150. John Langburne VK2ZLJ, Flat 4, 38 Arthur St., Balmain, N.S.W., 2041.

Yaesu FRDX400/FTDX400. Condition as new. First used Jan. 1974. Can be used as separate units or transceiver. Original packing and handbook, $550. Firm. VK2OW, QTHR. Ph. (069) 82 2003.

Ken KP202 with nicads and charger, stubby helical, PL259 adapter, leather case, xtals for chans 40 and 50, repeaters 2, 3, 5, 6, 7 and 8. Perfect condition, $140. VK3BJP, QTHR. Ph. (03) 560 2804.

ICOM IC22A, perfect condition, xta's for chans 40 and 50, repeaters 2, 3, 4, 5, 6, 7 and 8, anti-repeater 2, $150. VK3BJP, QTHR. Ph. (03) 560 2804.

Monoband Beam, 20m 3-el. rugged beam, with 1½ in. Dural full-length elements, 20 ft. oregon boom and omega matching unit. I will demonstrate to you in the shack; we will dismantle it; and you will pay $100 and take away! VK3AHR, QTHR. Ph. (03) 83 4203 A.H.

Pye 743 solid state compact transceiver, high band for 2m FM, complete with new cradle, telephone-type handset and matching speaker, $160. L30134. Ph. (03) 467 2131 Bus.

Swan 500C, AC PSU, mic. and manual, no mods, excellent condition, original packing, $360. Swan Vox unit to fit 300, 500, 350C, 500C, $35. VK2BBR, QTHR or ph. Rob Black (066) 21 4384 Bus.

Ham Radio — April 1968 to June 1972, 73 — June 1961 to December 1972. QST—May 1963 to April 1971. CQ—Odd copies 1961 to 1966. Amateur Radio — July 1962 to December, 1974. What offers? VK3QW, QTHR. Ph. (03) 560 0645.

Hallicrafter HT37 Tx, SX101A Rx, first class condition with manuals. Bendix BC221 freq. meter, type "S", power supply. VK3JA, QTHR. Ph. (055) 66 5117.

Yagi Antennas, ex 470 MHz links, each consists of two 6-element beams matching, approx. 2m, heavy co-ax. and type N connector, suit conversion to 50cm or 70cm, etc, $10 each. Jeff VK3ZJS, QTHR. Ph. (03) 37 1332.

Yaesu FT-620, AM USB LSB, exc. cond., with Cush-Craft 5-el. beam, $330. Yaesu Monitorscope YD100, all cables, manual, $150. Belcom Liner, xtal synthesised, 2m SSB transceiver, incl. xtal for satellite, 10W, $180. P. Laycock VK3BOL. Ph. (03) 718 2122.

SILENT KEYS

It is with deep regret that we record the passing of —

Mr. G. S. C. SEMMENS	**VK3GS**
Mr. R. W. G. WEHR	**VK5ZAV**
Mr. G. GLOVER, O.B.E.	**VK3AG**
Mr. C. R. McNALLY	**VK3CE**

Yaesu FTDX401 transceiver, unmarked, in perfect condition, with manual, $400. Yaesu FTDX560, perfect condition, fan installed. Also have noise blanker and crystal filter for above, $350 VK2CX, 25 Tomaree St., Nelson Bay, 2315.

Eddystone EC10 Mark 1 transistorised general cov. Rx AC/DC, suit novice or as second Rx, good condition, $150. Mrs. Howell, 17 Sherwin Ave., Castle Hill, 2154. Ph. (02) 634 1093.

204 BA—full size 4-element 20m beam antenna fitted with stainless steel hardware, excellent order, packed f.o.r. Kingston, $200 ONO. Owner going mobile walkabout VK. VK5XB, QTHR. Ph. (087) 67 2205.

Cheap registrations for the Canberra Easter Convention—OM's $5.50; XYL's $3.0; Harmonics 50c. THE radio event of the year with more prizes than ever before. See Inserts to November 1976 and February 1977 AR for details. Advance programe available from Box E338, Canberra, A.C.T., 260[illegible]

Yaesu FRDX400 Rx Deluxe Model (Hot Super Deluxe), complete EC, original boxing, manual, $225. VK3KK, QTHR. Ph. (03) 652 8110, bus. hrs., (03) 46 4200 AH.

WANTED

Contestants to share in over $1200 worth of contest prizes donated to the Canberra Easter Convention. Dust your sniffers off now folks, and don't miss out.

One old-fashioned morse buzzer; as used pre-oscillator days. Please advise price to: Ron VK3LY, QTHR. Ph. (03) 29 3709.

Transmitting tubes type QB3/300 or C1108 required by Indonesian missionary radio station. State price. VK5UV, QTHR. Ph. (08) 225 5985 Bus., (08) 382 3353 A.H.

FT101, any model, good working condition. 18AVT or similar. IC22A. VK3BHZ. Ph. (060) 71-6211 Bus. (060) 71-7244 A.H.

Service manuals for BC221 freq. meter and SCR522 Tx/Rx. Buy or copy. J. Pretty, 57 Bayview Ave., Earlwood, 2206. Ph. (02) 55 5430.

TRI band beam and rotator, 20-15-10m, Yagi type only. VK3ARD, QTHR. Ph. (03) 277 3954.

Atlas 215XHF SSB transceiver, prefer late model in good condition. G. R. Hovey VK1HG, 22 Eu[illegible] bene Dr., Duffy, A.C.T., 2611 or ph. (062) 88 [illegible] A.H.

Eddystone 750 or 888 Rx, going condition, price and particulars to VK4ZBI, QTHR.

Circuit dia. of following: solid state (12V) and valve, speech compressor, both suit high imp. mic. Also solid state and valve 10W linear amp. capable 4W input and 10W AM output on 27 MHz. Solid state unit suitable for 12V DC mobile operation. Have 2 E26's on hand for valve unit. All expenses refunded. Contact Col Paton VK4NBP, 225 Pallas St., Maryborough, Qld., 4650.

FT75 or FT101E or TS520 or Uniden 2020 transceiver. A self supporting 40-50 ft. tower. A TH3 Yagi or similar. Bumper mount for HF whip. John VK2NDP. Ph. (02) 639 7962.

Astro compass. These items were plentiful around disposal stores in the 50s. VK2OK, QTHR. Ph. (065) 68 1627.

FV401 external VFO unit for FTDX401. VK4RF, QTHR.

Helical whip aerials for 20, 40 and 80m bands. Bill Perry VK3BAV, 11 Miller St., Sandringham, 3191. Ph. (03) 598 8665.

Pensioner-Associate wants to swap "K" Command Rx 6-9 MHz, working order, with CCT etc., for Tx working order, any novice freq.; or sell best offer. R. S. Inman, North Arm Cove, C/- PO Karuah, NSW 2324. Ph. (049) 97 5365. Candidate for May Novice Exam.

Sideband Electronics Sales

HF TRANSCEIVERS

ASTRO - 200 digital solid state 200 W.P.E.P. P.O.A.

TRIO KENWOOD model TS 520 - D AC - DC 10 to 80 M. **$590**

TRIO KENWOOD model 520 - D AC only 10 to 80 M. **$650**

TRIO KENWOOD model TS – 820 – S AC only 160 to 10 M. with digital readout **$980**

TRIO KENWOOD model TS - 820 AC only 160 to 10 M. **$850**

TRIO KENWOOD DS 1 DC Converter **$ 65**
VFO - 820 **$145**
DG - 1 Digital Display **$160**
YG. 88C Crystal Filter **$ 64**
SP. 520 - 820 **$ 36**

TRIO KENWOOD model TS - 700 - A FM-AM-CW-SSB transceivers. Full 144-148 MHz coverage, 10-Watt output, VFO controlled, self-contained, AC-DC operation. **$650**

TRIO KENWOOD model TS-600-A FM-AM. SSB transceiver full 50-54 MHz coverage 10 Watt output variable form 1 Watt to full power. VFO controlled AC-DC operation. Styling as TS-700-A. P.O.A.

TRIO KENWOOD model TR-7400 2 meter FM transceiver 10 to 25 watts output. Frequency range 144.00 to 147.995 MHz No. of channels 800, Double conversion superheterodine sensitivity better than 0.4 UV for 20 DB. **$385**

KYOKUTO 2 M FM 15 W output transceivers with digital read-out and crystal synthesized PLL circuitry now tiwh 800 transmit and 1000 receive channels 5 KHz apart, covers all of 144-148 MHz, receive to 149 MHz. No more crystals to buy. Includes simplex, repeater and anti-repeater operation. **only $310**

NOVICE OPERATORS
All above HF transceivers will be modified for low cost to suit novice. Requirements 27 MHz conv. x-tals in stock now for kenwood models.

IT IS HERE AGAIN, the well known SE-501 in new style case 15 Watt pep 23 AM SSB for as low as **$215**
Same model with AC built in supply and DC built in SWR power meter and many goodies. **$260**

ICOM
VHF TRANSCEIVERS SSB
ICOM model IC-202 2 M SSB portable transceiver 144-144.4 MHz **$215**

ICOM model IC-502 6 M SSB portable transceivers 52-53 MHz **$215**

USED EQUIPMENT
Collins KWM-2 - A in new condition with power supply **$1,600**
PM.2
6146 – b valves RCA new Large stock **$10 each.**

FDK MULTY QUARTZ with 24 channels 10 sets of crystals supplied 10 Watts, new style. **$265**

YAESU MUSEN model FT-101-E AC - DC transceivers 10 to 160 M with speech processor P.O.A.

YAESU MUSEN model FT - 301 P.O.A.

YAESU MUSEN model FT 301 - D P.O.A.

YAESU MUSEN model FT - 301 - S P.O.A.

YAESU MUSEN model FP – 301 P.O.A.

YAESU MUSEN FR 6-7. Uses Wadley loop principal **$300**

YAESU MUSEN model YC-500
FREQUENCY COUNTERS P.O.A.

HY – GAIN ANTENNAS
14AVQ 10-40M. verticals, 19' tall, no guys **$ 65**
18AVT-WB 10-80 M. verticals, 23' tall no guys **$ 95**
TH3JR 10-15-20 junior 3 el. Yagi 12' boom **$ 16**
TH3MK3 10-15-20 senior 3 el. Yagi 14' boom **$220**
TH6DXX 10-15-20 senior 6 el. Yagi 24' boom **$250**
HY-QUAD 10-15-20 cubical quad Yagi 8' boom **$250**
TIGER ARRAY 204BA 20M4el. Yagi 26' boom **$250**
BN-86 balun for beam purchasers only **$ 25**

CUSH CRAFT ANTENNAS
A144-11 11 Element 2M-Yagi **$ 45**
A147-11 11 Element 2 M Yagi **$ 45**
A147-20 combination horizontal vertical 2 M **$ 70**
A144-20 combination Yagi with matching harness circular polarization **$ 75**

ANTENNA ROTATORS
Model CDR Ham-11 for all hf beams except 40 M **$200**
Model CDR AR-22 L junior rotator for small beams **$ 65**
KEN model KR-400 for all medium size hf beams with internal disc brake **$110**
KEN model KR-500 for vertical control of satellite tracking **$110**
All models rotators come complete with 230-volt AC indicator-control units.
6-conductor cable for KR-400-500 **65 cents per metre**

COAX CABLE CONNECTORS
PL-259 **$1.20**
SO-239 Chassi Mount **$1.20**
Male to male joiner **$1.20**
Female to female joiner **$1.20**
Angle connector **$1.70**
T-.connector **$2.00**

COAX CABLE
RG - 8 - U foam filled per metre **$1.20**

SWR METER
Twin meter model: Y.M. - I.E. 3.5 to 145 MHz prof quality **$ 28**

DRAKE TV - 3300 TVI lowpass filter **$ 31**
SSR-1 Receivers **$270**

All prices quoted are net SYDNEY, N.S.W., on cash-with-order basis, sales tax included in all cases, but subject to changes without prior notice. ALL-RISK INSURANCE from now on free with all orders over $100; small orders add 50c for insurance. Allow for freight, postage or carriage; excess remitted will be refunded.

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